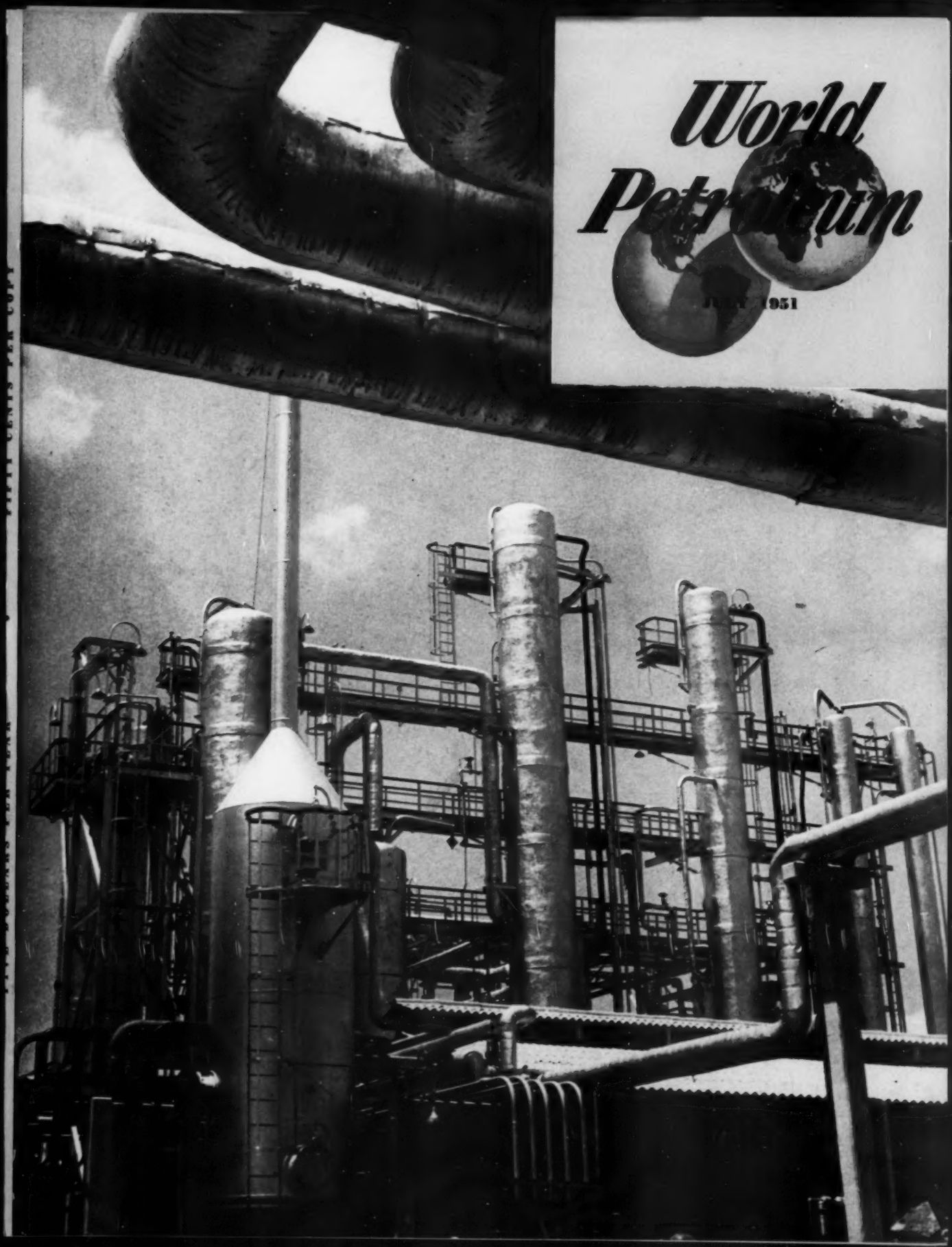

World
Petroleum
1951

WARREN'S *Stabilized*

NATURAL GASOLINE *and* STA-VOL-ENE

WARREN constantly maintains intensive research and study of the exacting, growing and changing demands of today's highway and skyway traffic. To keep up with these needs, WARREN offers STABILIZED Natural Gasoline and Butane which assure refiners the uniform quality, high octane, greater volatility and low front end factors so necessary in modern motor fuel. STABILIZE your service, too.

SERVICE

PRODUCTION

QUALITY

NATURAL GASOLINE
Propane
Iso-Butane
Butane
Iso-Pentane
Normal Pentane
Hexane
Heptane
Heavy Naphtha
STA-VOL-ENE

For a Better **MOTOR FUEL**

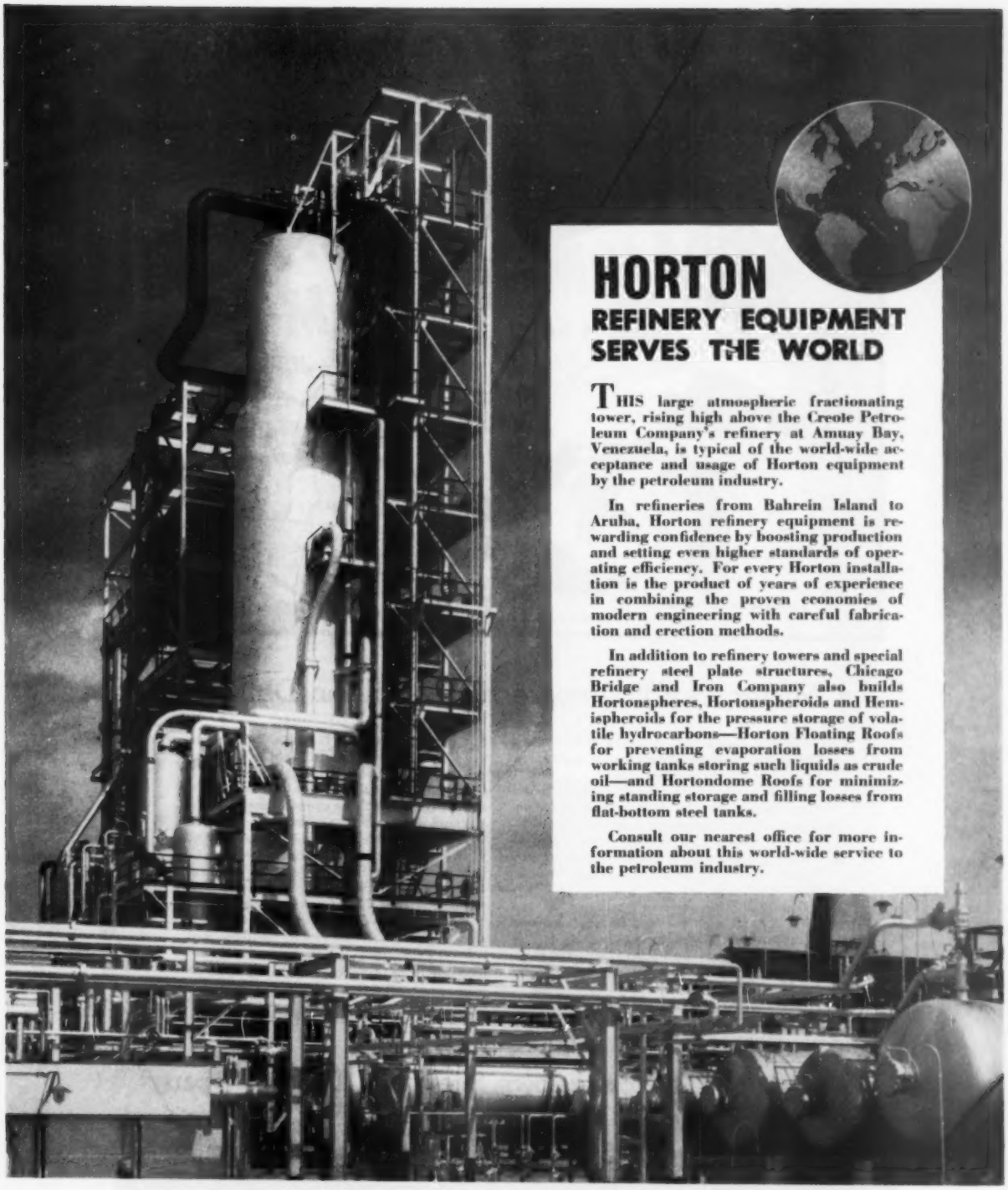
WARREN PETROLEUM CORPORATION

Producers, Manufacturers, Exporters and Marketers

Export Terminals: Corpus Christi, Port Arthur, Baytown, Texas City, and Narsworthy, Houston, Texas

TULSA 2, OKLAHOMA CABLE ADDRESSES: Stavolene, Warren

Crude Oil, Natural Gasoline and Liquefied Petroleum Products



HORTON
REFINERY EQUIPMENT SERVES THE WORLD

THIS large atmospheric fractionating tower, rising high above the Creole Petroleum Company's refinery at Amuay Bay, Venezuela, is typical of the world-wide acceptance and usage of Horton equipment by the petroleum industry.

In refineries from Bahrein Island to Aruba, Horton refinery equipment is rewarding confidence by boosting production and setting even higher standards of operating efficiency. For every Horton installation is the product of years of experience in combining the proven economies of modern engineering with careful fabrication and erection methods.

In addition to refinery towers and special refinery steel plate structures, Chicago Bridge and Iron Company also builds Hortonspheres, Hortonspheroids and Hemispheroids for the pressure storage of volatile hydrocarbons—Horton Floating Roofs for preventing evaporation losses from working tanks storing such liquids as crude oil—and Hortondome Roofs for minimizing standing storage and filling losses from flat-bottom steel tanks.

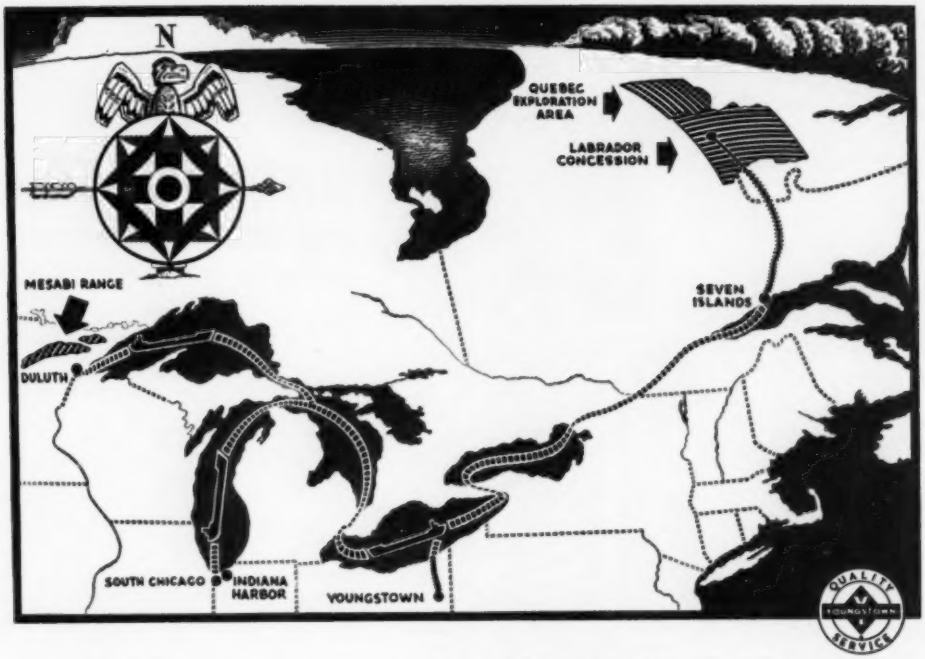
Consult our nearest office for more information about this world-wide service to the petroleum industry.

CHICAGO BRIDGE & IRON COMPANY

Chicago • Houston • Tulsa • San Francisco • Birmingham • Atlanta • Cleveland • Philadelphia • Los Angeles • Salt Lake City • Boston • Seattle • Detroit • Washington
Plants: Birmingham, Chicago, Salt Lake City and Greenville, Pa., U.S.A.
Export Office—165 Broadway Building, New York 6, N. Y., U.S.A.

REPRESENTATIVES AND LICENSEES

Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Comprimo N.V., Amsterdam—O, Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Horton Steel Works, Limited, Fort Erie, Ontario, Canada
W. P. Bryant, Edificio Abreu 402, Havana, Cuba
Sociedade Chicago de Construcoes Ltda., Rio de Janeiro, Brazil



Mister, can you spare Half a Billion Dollars?

ONE half a billion dollars may seem like pin money compared to the sums mentioned for our national finances.

But it is more than three dollars for each man, woman and child in the United States. It is more than the entire steel industry earned in the "dreadful decade" from 1930 to 1939. It's more than America spent to win two wars--the War of 1812 and the Mexican War, combined.

Approximately one half a billion dollars is the estimated sum that a group of steel and mining companies, one of which is The Youngstown Sheet and Tube Company, is investing to guarantee future iron ore supplies for America. In the Mesabi iron range of Minnesota, development projects are under way which will produce millions of tons of iron concentrates from taconite. In Labrador and Quebec, a vast deposit of high grade ore is being developed. Plans include building a 360-mile railroad into the wilderness to ore docks on the St. Lawrence River.

Where does this money come from? From an unnoticed addition to our national debt? From "extra nickels" tucked away in the Federal budget? From more taxes levied on every citizen's income? *Certainly not!* Development of these ore reserves will be financed by each participating Company asking its shareholders to share in its tremendous cost.

America, in peace or in war, is served--now --and for generations to come. This is free enterprise. This is the system that created America from a wilderness and is the only sure way to keep it vigorous and strong.

Scrap Metal is Critical Again

The Youngstown Sheet and Tube Company

General Offices--Youngstown 1, Ohio
Export Offices--500 Fifth Avenue, New York
MANUFACTURERS OF CARBON ALLOY AND YOLOY STEELS

The steel industry is using all its resources to produce more steel, but it needs your help and needs it now. Turn in your scrap, through your regular sources, at the earliest possible moment.

NOW . . . McEVOY VALVES ALSO MADE IN ENGLAND

McEvoy Company has licensed Newman, Hender & Co., Ltd., well known British manufacturers, to produce McEvoy valves for sterling bloc distribution

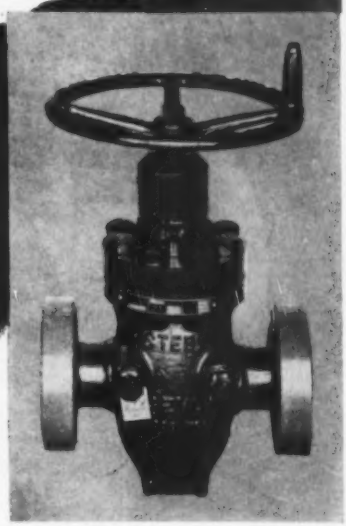
After testing all types of high pressure valves for the oil production industry, Newman, Hender & Co., Ltd., recently applied to the McEvoy Company of Houston, Texas, for rights to produce the McEvoy Gate Valve in England for sterling bloc distribution. This includes all parts of the world, excepting the United States and Canada.

Permission has been granted and, effective immediately, Newman, Hender will manufacture the complete line of McEvoy Gate Valves in their English plant.

McEvoy valves manufactured by Newman, Hender & Co., Ltd., will be called "Newman-McEvoy" valves. Those made in Houston by McEvoy will continue to be designated by the familiar McEvoy name.

Otherwise, whether made in the U. S. A. or in Great Britain, these service-tested gate valves will be absolutely identical, with all parts interchangeable.

Oil producers, particularly in remote foreign areas, will benefit by the new trade agreement in vastly extended, world-wide distribution and greatly increased availability of McEvoy Gate Valves.



McEvoy and Newman-McEvoy Gate Valves are available everywhere in all sizes and all working pressures normally required in oil production. See Composite Catalog or write for illustrated Catalog 51.

McEvoy COMPANY

TEXAS AND MILBY ST. • P. O. BOX 3127 • HOUSTON 1, TEXAS

Export Representative: E. F. Gahan, Inc.,
Room 1223, 500 Fifth Avenue, New York, N. Y.

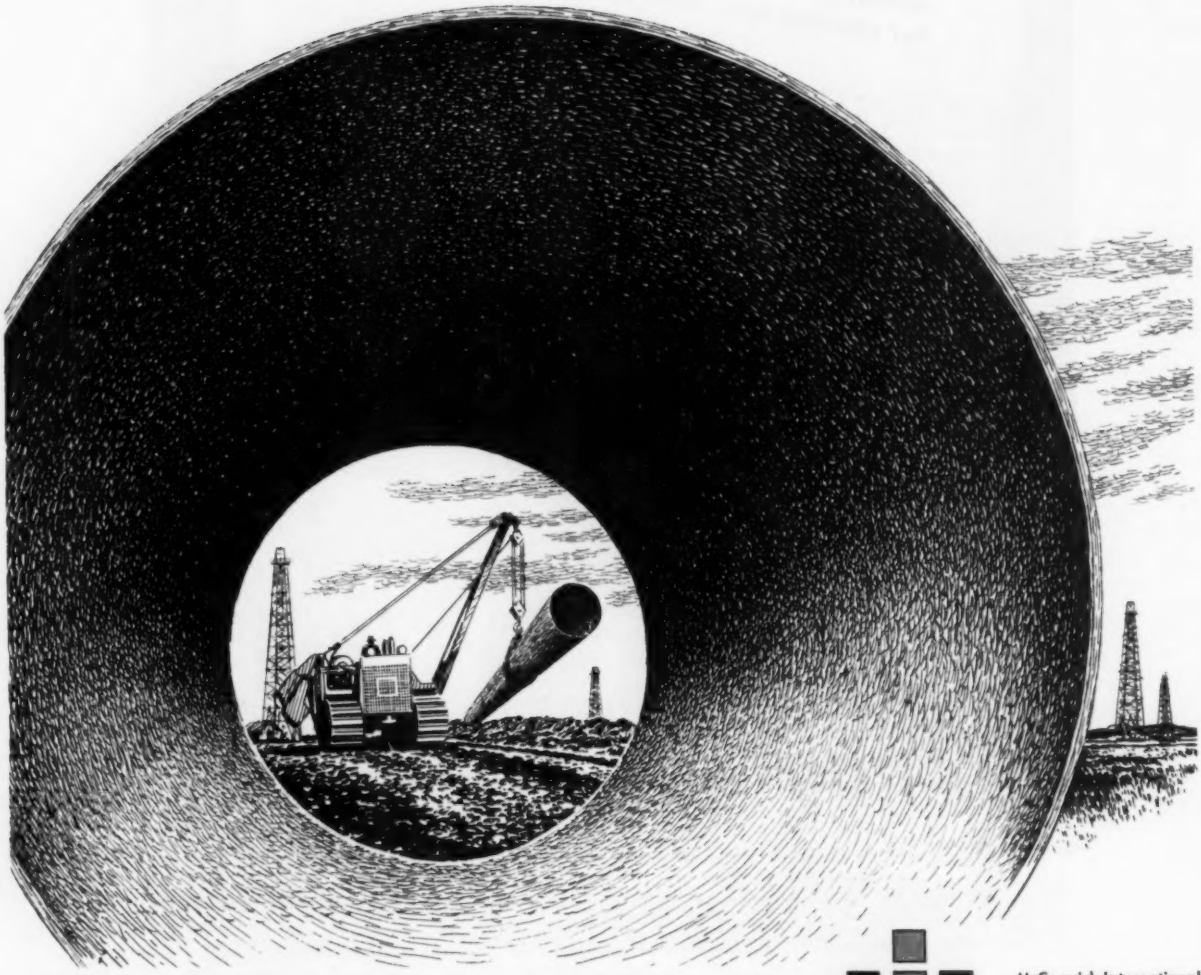
WORLD PETROLEUM for July, 1951. Vol. 22, No. 7, July, 1951. WORLD PETROLEUM is published monthly by Mona Palmer, Trustee under the will of Russell Palmer, 2 West 45th St., New York 19, N. Y. Acceptance at East Stroudsburg, Pa., under Section 34.64 P. L. & R. Authorized. Subscription rate: $5.00 per year, single copies 50c.

When economic health comes by the gallon!

Healthy industries make healthy nations. For example, petroleum is a *basic* industry that must maintain and increase its production. When it does, a multitude of other industries prosper with it.

Rugged International Diesel tractors, power units and related equipment serve the petroleum industry well. They handle *every* power job; they clear and level land for drill rigs, man the pumps and lay pipe a hundred miles or more.

Consider the *basic industries* that make up the *physical and economic security* of your nation. International Harvester contributes strength to these industries by providing the necessary tools for transport, agriculture and all phases of earthmoving and construction. International Harvester Export Company, 180 N. Michigan Ave., Chicago 1, U.S.A.



INTERNATIONAL HARVESTER

BUILDER OF ESSENTIAL EQUIPMENT FOR ESSENTIAL WORK

McCormick International Farm Equipment • International Trucks • International Industrial Power • International Harvester Refrigeration

A Letter from Trieste

„AQUILA"
Società per Azioni Tecnico - Industriale
Cap. Soc. L. - - - - - Versi L. - - - - -
RAFFINERIA OLII MINERALI
TRIESTE

December 27, 1950

Mr. I.V. McGill
E.B. Badger & Sons Co.
75 Pitts Street
Boston, Massachusetts.

Dear Mr. McGill,

We are bringing to an end the tests on the furfural plant and during the next few days we shall start operations.

From my office I can see the smoke of the stacks of the two heaters which are now drying out; it seems impossible to me that such a result could be obtained in this very short time. If I well remember, the first discussions on plant proportioning and our first meeting in Boston took place in August 1949.

On the occasion of the starting of the first luboil plant I wish to express you my sincerest congratulations for your wonderful way in organizing this work; you must be really satisfied with the successful result obtained.

Yours sincerely,

T.L. de Pastrowich
Technical Director

The Aquila Lubricating Oil Refinery in Trieste was the first engineering contract let under an E.C.A. loan. Legal problems, language difficulties and labor deficiencies were taken in stride and Badger completed the job three months ahead of schedule.

The refinery was designed and constructed by Badger and consists of a Propane Deasphalting Unit, a Furfural Plant, an MEK Dewaxing Plant and a Clay Contacting Unit. A full range of lubricating oils and finished waxes are manufactured with a maximum annual lube output of 32,000 tons.

Badger's broad experience in foreign work is available for projects of every size all over the world.

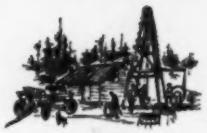
E. B. BADGER & SONS (Great Britain) LTD.
99 ALDWYCH · LONDON · W. C. 2.

PROCESS ENGINEERS and CONSTRUCTORS for the PETROLEUM, CHEMICAL and PETRO-CHEMICAL INDUSTRIES

What Happens When 150,000,000 People Say:

"I WANT!"

THE STORY OF OIL



COLONEL Edwin Drake's oil well, drilled in 1859, produced only 20 barrels daily . . .

But it gave people a taste of the benefits of petroleum—and a great industry was off to a flying start!

The first drilling rigs—first refining equipment—were adequate for that early demand.

But invention of the automobile, airplane, Diesel engine and other great machines in turn demanded great invention in oil—and old-fashioned equipment gave way to scientific research laboratories, modern refineries, pipelines, tankers and tank cars.

Each year demand made them bigger and better!

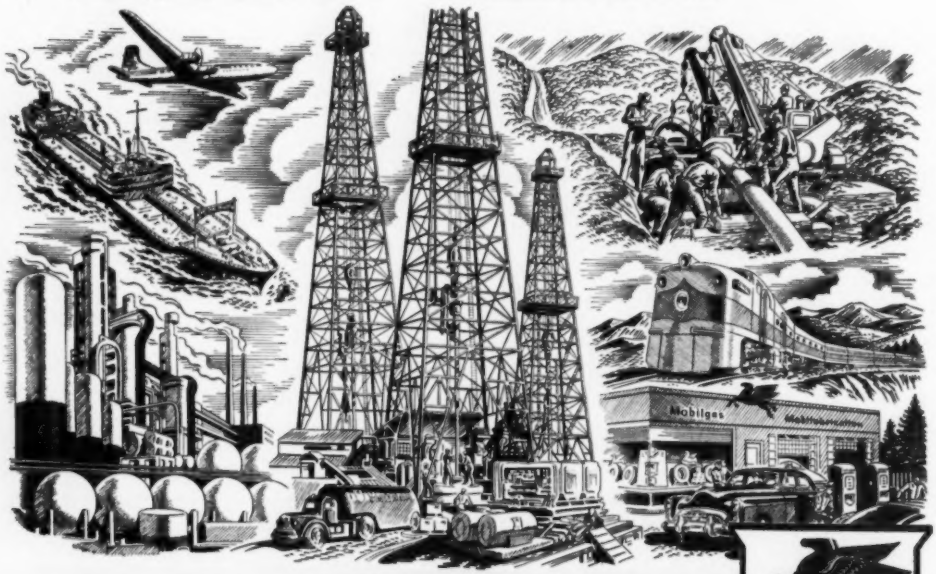
Today, thousands of oil companies with oil fields, refineries, bulk plants, service stations and cost-cutting transportation systems—deliver over 1,840,000,000 barrels of petroleum yearly—meet U.S.A.'s demands for *value in oil.*

And, today, the responsibilities of Socony-Vacuum, one of the oldest companies in the industry, are constantly mounting . . .

Unprecedented demand for petroleum products calls for expansion in every phase of our efficient, coordinated operation . . .

46,400 independent "small" businessmen must be kept *competitive*—supplied with what it takes to provide a *big money's worth* for you—a good living for themselves.

When 150,000,000 Americans say, "*I want,*" it takes businesses of all sizes to deliver!



DEMAND DETERMINES BIGNESS

The Flying Red Horse Companies

SOCONY-VACUUM OIL COMPANY, INC. • MAGNOLIA PETROLEUM CO. • GENERAL PETROLEUM CORP.

SOCONY-VACUUM

...a sign you can believe in

You are apt to see this sign anywhere. It might be on a 'dozer "hogging out" a raw site for a refinery in Europe or the Near East; or on a 100-ton vessel in transit to South America, Canada, or the Orient; or on the control board of a petroleum chemical plant on the Gulf Coast. It might even be as close as the cover of a proposal lying on your own desk.

But wherever you see it, it symbolizes a project in capable hands—Lummus hands. It stands securely on its world-wide record—the designing and constructing of nearly 200 units of all types for the manufacture of motor gasoline, high octane aviation fuel, and fuel oils . . . more than 115 lube oil and wax processing plants . . . over 300 units for making chemicals and petroleum chemicals . . . and a score of complete refineries and chemical plants.

It's a good sign to look for, believe in, and rely on when you buy complete, integrated engineering service for *your* next project.

THE LUMMUS COMPANY

385 MADISON AVENUE, NEW YORK 17, N. Y.

CHICAGO • HOUSTON • LONDON • CARACAS • PARIS

DESIGNING ENGINEERS AND CONSTRUCTORS FOR THE PETROLEUM AND CHEMICAL INDUSTRIES

Speeds Work from Prospecting to Pipeline

Built for rugged, off-the-road service, the 4-Wheel-Drive Willys Station Wagon is a big help to exploration parties and pipeline workers.

With 4-wheel-drive traction and high-compression "Hurricane" engine, it has the pulling power needed to get men and materials through to hard-to-reach places. Six passengers can ride in this car —and there is plenty of space for supplies and equipment. Still more load space is gained by removing the rear seats. The rear door swings down flush with the floor, making bulky objects easier to load. The 4-Wheel-Drive Willys Station Wagon is ideal for personal transportation and light hauling *anywhere* in the oil field.

4-Wheel-Drive WILLYS Station Wagon

WILLYS-OVERLAND EXPORT CORPORATION
Toledo 1, Ohio, U.S.A.

SERVICE LEDGER
1901-1951

ANGLO-IRANIAN OIL CO. LTD.
ARGENTINE GOVERNMENT OIL FIELDS
ARGENTINE MINISTRY OF WAR
ATLANTIC REFINING CO.
ATOMIC ENERGY COMMISSION
BRITISH AMERICAN OIL CO. LTD.
CANADIAN OIL REFINERIES, LTD.
CALIFORNIA REFINING CO.
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CIE. FRANCAISE DE RAFFINAGE
CIE. INDUSTRIELLE DES PETROLES
CITIES SERVICE OIL CO.
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KANOTEX REFINING CO.
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PAN AMERICAN REFINING CORP.
PENNZOIL CO.
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PURE OIL CO.
SHELL CHEMICAL CORP.
SHELL OIL CO.
SHERWIN-WILLIAMS CO.
SINCLAIR REFINING CO.
SKELLY OIL CO.
SOCIETE DES RAFFINERIES DE PETROLE DE LA GIRONDE
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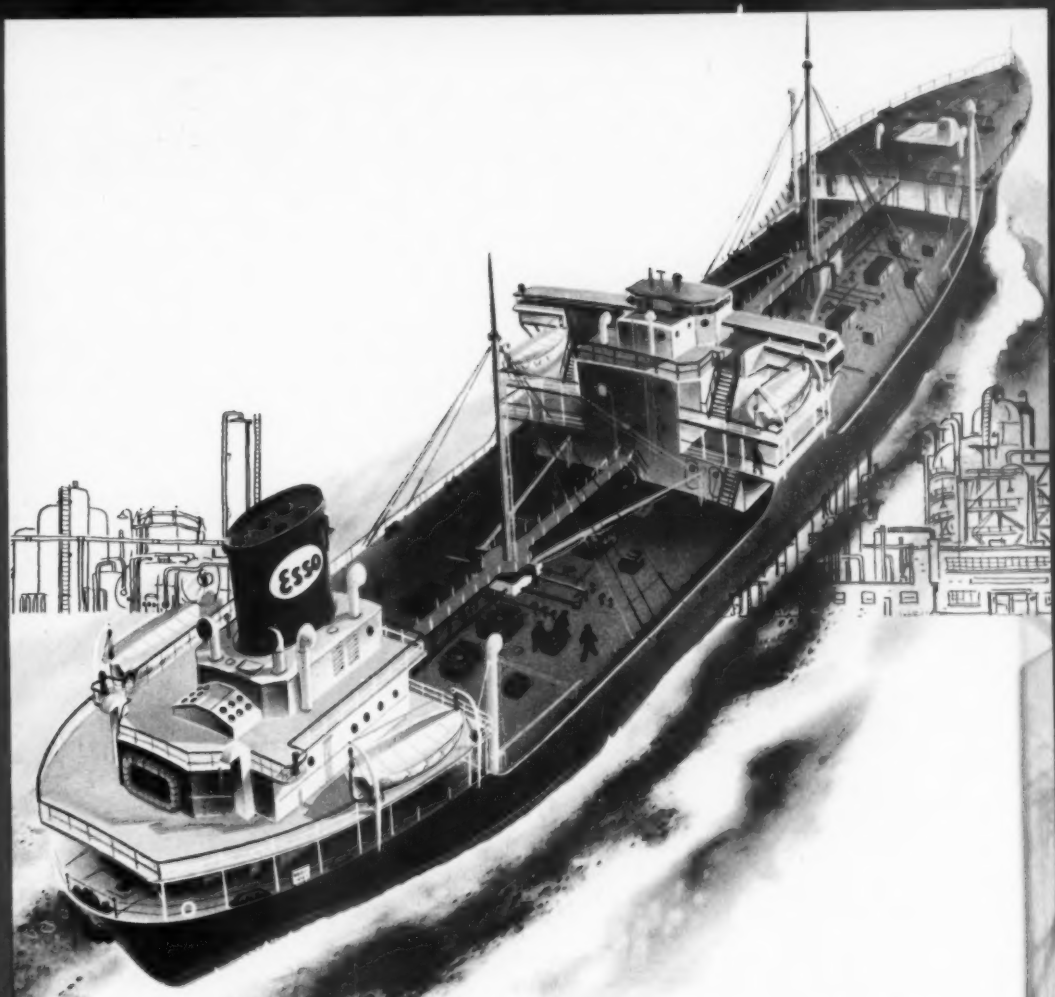


From pipe stills to fluid cats...with Jersey!

Various Jersey-Standard affiliates have been on Kellogg's customer ledger for twenty-five years. In that time, Kellogg has built a score and more of process units for the New Jersey, Maryland, Louisiana and Aruba refineries of Jersey affiliates.

Process development also found these two companies working along the same paths, a fact which culminated in Kellogg being entrusted with the erection of the world's first Fluid catalytic cracker...in 1941 at Esso Standard Oil Company's Baton Rouge Refinery.

In the last decade, following this historic development, Kellogg has erected for Jersey Standard and its affiliates —seven more Fluid "cats", the largest hydroformer in the world, a hydrogenation unit, combination thermal units, delayed coker, thermal reformers and propane and phenol processing plants... on three continents...units capable of processing almost 500,000 BPD of petroleum products.

THE M. W. KELLOGG COMPANY

A SUBSIDIARY OF PULLMAN INCORPORATED

for fifty years an integral part of processing history

NEW YORK JERSEY CITY LOS ANGELES TULSA HOUSTON TORONTO LONDON PARIS

Portrait at

This year is Kellogg's fiftieth of service to industry. At this time naturally, as a group of men—known collectively to the modern business world as The M. W. Kellogg Company—we can think back nostalgically. We can remember the chimney stacks

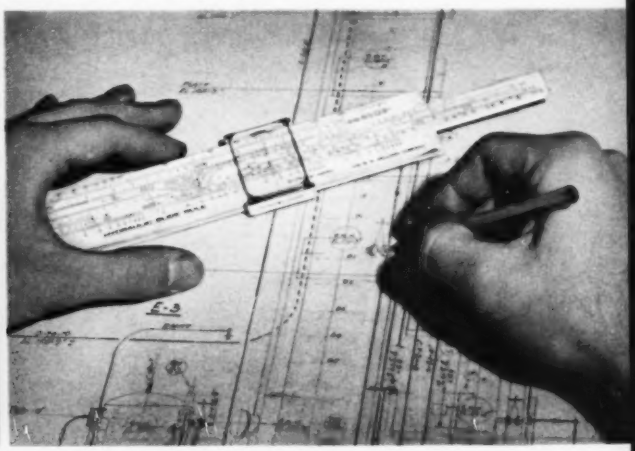
"Getting the Most out of Talent"

Preceding camera "portraits" of M. W. Kellogg today, appearing in this publication, have guided the regular reader through the major research and development phases of Kellogg operation, through Process Engineering, and through the basic steps of Design Engineering.

This month, the camera focuses on a few of the many special groups and unique devices that Kellogg utilizes to make the efforts of its design engineers more efficient.

1. ***FOR EVERY SPECIFIC PHASE*** of design engineering there is a complete matching group of specializing engineers. This view of a section of the ***Heat Transfer Division*** shows only the "figure men"—engineers specifying type of exchangers and general design limitations. Detail engineering is done elsewhere. Another group handles design of electrical systems and instrumentation exclusively.

4. ***USUALLY ASSOCIATED*** with wages, hours and cost accounting, these modern punch card machines serve the engineering departments in a slightly different manner. Through keeping continuous records of engineering time "by *type* of job" rather than "by job", realistic budgets are achieved of engineering time required to perform any of the hundreds of engineering tasks comprising a refinery project.



5. ***BUT MAN AND BRAIN POWER*** to do these supporting tasks, that make design engineers more efficient, are not the only "extras" present in the organization. Specialized and unique tools are created and made available to design engineers. This slide rule was created by Kellogg engineers to speed up the computation of vapor and liquid flow through process piping of various diameters under varying operating conditions.

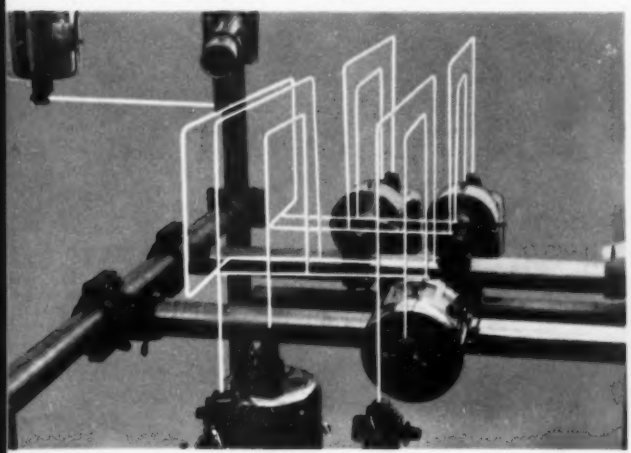
Fifty... no 6

we built in 1901 . . . the first crude vessels for oil refiners in the 'teens . . . our first combination unit. The forty-odd Fluid cat crackers built in these years. But, after all, The M. W. Kellogg Company is only a factor as it is able to serve industry today. For that reason, we are presenting this series of monthly camera studies which document our belief that a truly integrated organization can better serve industry to achieve greater earning power. This is No. 6 in the series.

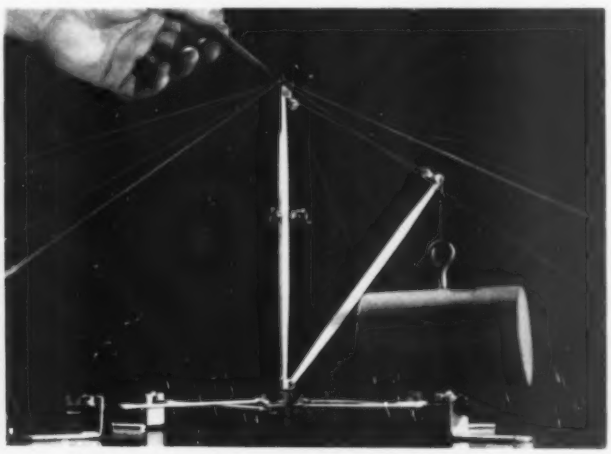
KELLOGG
1901-1951
50th Anniversary

2. *AS REPLETE WITH DESIGN* engineering talent as Kellogg is, the organization's abilities are equally dependent on many other technicians. Of major importance among these is the *Estimating Engineering Staff*. Besides estimating costs of new projects, this group serves refiners through its trend charts of the major cost ingredients of refinery projects. These pinpoint for design engineers the best potentials for economies.

3. *CLOSELY ALLIED TO ESTIMATING* is the engineering job of *Scheduling*—not only of the engineering work itself, but of purchasing, fabrication and construction as well. Experience of Kellogg's scheduling personnel is measured in decades. This experience stands customers in good stead in the setting up of realistic schedules for completion of a project at the earliest possible date consistent with expenditure limitations.



6. *THIS MODEL TESTER* for piping systems employs special Kellogg-conceived electrical measuring heads. The device permits the rapid and accurate calculation of pipe stress problems in a matter of minute . . . problems which would otherwise involve the solution of as many as 50 to 60 simultaneous equations, virtually "impossible" mathematically from the standpoint of time consumption.



7. *ANOTHER SPECIAL AID* is this guy derrick model equipped with strain gauges. This tool permits engineers, in making plot plans and issuing field fabrication instructions, to check *in advance* the exact methods required to lift vessels safely into position. There are perhaps a score of such useful "gadgets" scattered about the engineering floors. Of course, they save hours of time, but, much more important, they permit true accuracy in planning.

NEXT MONTH

. . . in the seventh in this series of camera studies of M. W. Kellogg today . . . you will review the important role that Technical Data and Standards play in the engineering and procurement functions.

Toughness built in for a tough exchange job!

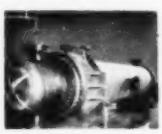
M. W. KELLOGG

This 8 foot diameter tube sheet is for a recycle-catalyst cooler on a giant cat-cracker. Tons of erosive powder will pour through the cooler's tubes in minutes as it controls regenerated catalyst temperature. Kellogg's exclusive fabricating techniques really pay off in equipment for such tough processing jobs.

Pressure Vessels
Vacuum Vessels
Fractionating Columns
Drums and Shells
Heat Exchangers
Process Piping
Hi-pressure—Hi-temp Power Piping
Bends and Headers
Giant One-Piece Bends
Forged and Welded Fittings
Radial Brick Chimneys

Continuing Basic Study of heat exchange by Kellogg development groups over 20 years has produced unduplicated design data.

Shop Layout Craftsmen have had experience on all types of heat exchangers, from marine condensers to jet engine combustion-chambers.



Rigid Quality Control is maintained by inspectors reporting directly to *Shop Management* rather than to *Production* executives.

Extensive Shop Facilities, from plate forming to stud threading, permit *complete* fabrication of any type heat exchanger.

Special Shop Techniques—the component parts of each exchanger are fabricated as a production unit, building in the advantages of "tailor-made" fit.

NEWS FOR OPERATORS IN WESTERN CANADA!

The Canadian Kellogg Company Ltd. has established complete shop facilities for the fabrication of all types of piping at **EDMONTON**, Alberta. Inquire directly or through any Kellogg or Canadian Kellogg office.

The M. W. Kellogg Company *(A Subsidiary of Pullman Incorporated)* **New York, Jersey City, Los Angeles, Tulsa, Houston, Toronto, London, Paris**

Released from the production of War material many far-seeing Engineering Firms have joined in the race to meet the urgent call of Oil producers

The land is cleared

The site is chosen

for Plant and yet more Plant. In this country, Harveys of London have thrown in all their vast resources of men, material and "know how"

A railway is built

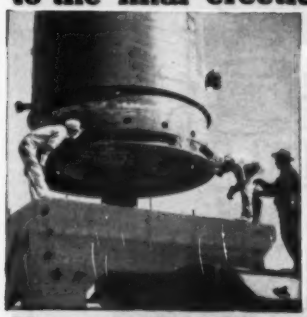
A column arrives

and have so geared production that they are meeting this huge demand with ever-increasing results which will bring benefit to millions.

Off loaded on site

It is gently raised

And so we see, stage by stage, from the clearing of virgin land to the final erection, a history of one of these Fractionating Columns.



and lowered into position

to start immediate production

Necessarily, this pictorial explanation is much condensed, but even so, it clearly evidences another triumph of British Engineering enterprise.

From the Shell Library come these scenes from various stages in the production and transport of one of these huge Fractionating columns.

Harvey

G.A.Harvey & Co. (London) Ltd. Woolwich Road, London, S.E.7

Valves and fittings

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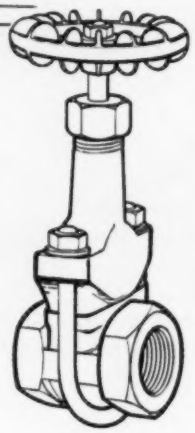

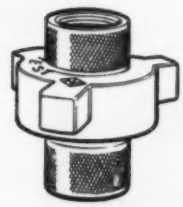

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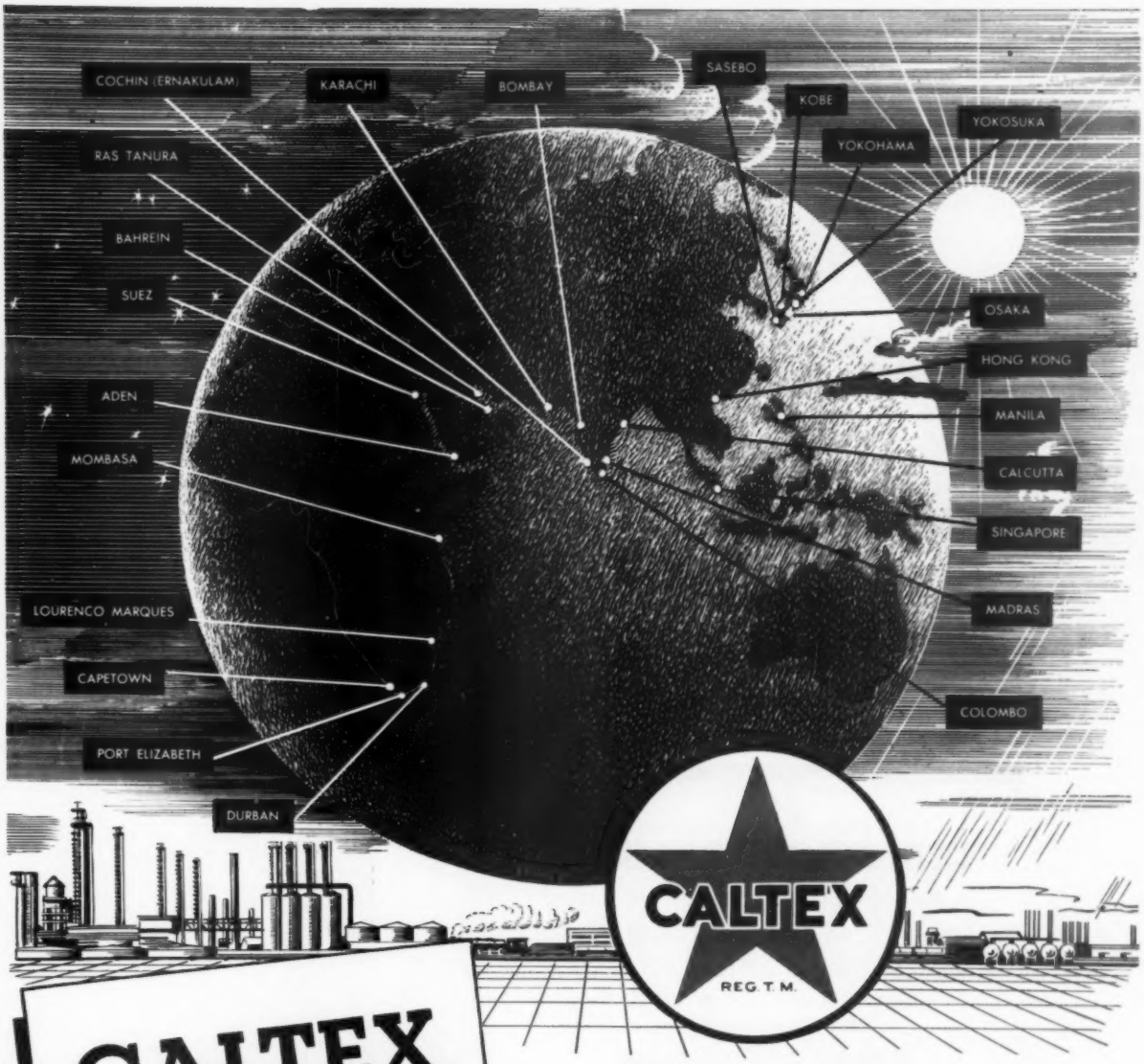

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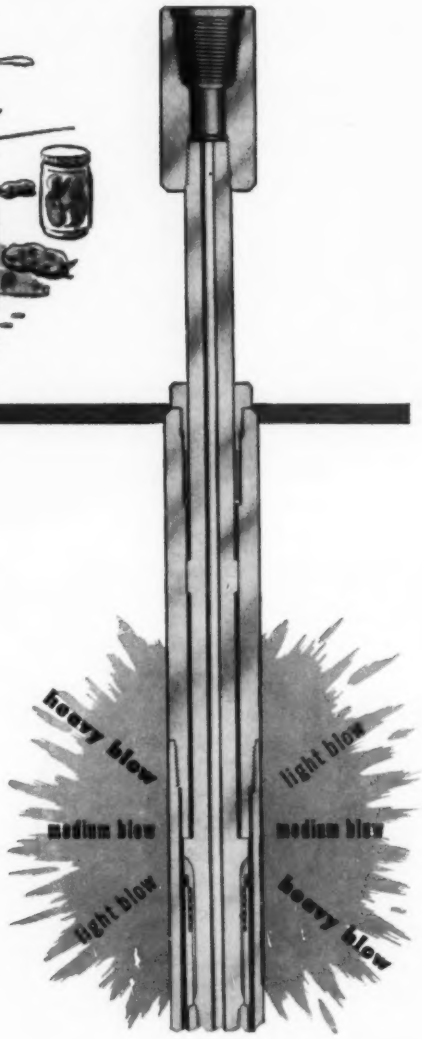

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The Management Publication of the International Petroleum Industry

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THIS MONTH'S COVER

A general view of the fractionating columns installed at the Mataripe refinery recently built by M. W. Kellogg Co. for the National Petroleum Council. Vessel in the foreground is the furnace blow-down drum. Columns, from left to right, are: the soaking chamber, combination tower, fuel oil flash tower, main fractionator, crude flash tower, stabiliser and absorber. Hot oil pump house is in the right foreground. An article describing the plant begins on page 33.

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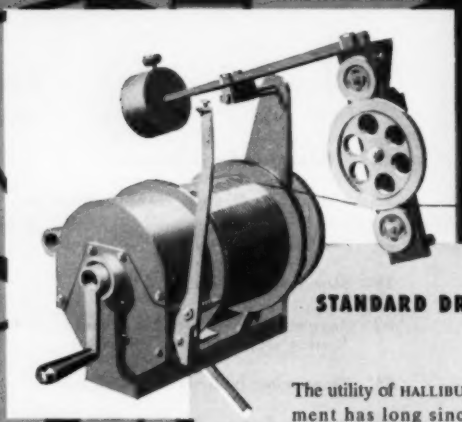

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A Model of Organization

THE HAGUE

OIL men from every quarter of the globe and every branch of petroleum activity converged upon this historic Netherlands town in the final days of May for the assemblage of the World Petroleum Congress. The gathering, third to be held in the space of 18 years and first since the close of World War II, presents some striking contrasts with its predecessors. First in the matter of attendance, the number of members present at the convention was much larger, over 2,000 being registered out of the total Congress enrollment of 3,300, besides several hundred wives and a large number of visitors attracted by the event who did not take the trouble to adopt membership. The 1951 Congress likewise was more widely representative than the earlier ones, with delegates from more than 40 countries. Thirdly, and perhaps most important, the number of papers submitted for discussion was much greater than ever before, and the range of topics was correspondingly broader. The total number of papers accepted for consideration was 286, and as usually happens, there were some that arrived too late for inclusion on the agenda.

Naturally these papers reflected strikingly the great expansion that has taken place in the operations of the petroleum industry and in the variety of its activities and products. At the first Congress, held in London in 1933, a large percentage of the studies offered dealt with the properties of kerosine and methods of its treatment. In this year's meeting that subject was not excluded, but it hardly figured in the discussions, the emphasis being upon cracking methods, various forms of catalysis and the production of chemicals from petroleum. The many aspects of production, from geological and geophysical exploration, through well drilling and operation to the construction and protection of equipment, provided material for a greater number of contributors than any other general classification.

To enable attendants at the Congress to concentrate attention on the subjects in which they were most interested, the program was divided into ten sections according to the special topics to be discussed, with subsections in the case of the more crowded divisions. Reading of papers was dispensed with, but each member was supplied with preprints of the entire list to enable him to make selection of the group that appealed to him. The time spent in sectional meetings was devoted to discussion of points raised by the authors. A committee appointed for each section arranged a general program for the discussions, and technologists familiar with the subjects to be considered were assigned to report the proceedings. This arrangement resulted in a great saving of time and enabled the sectional groups to get through programs that otherwise could not have been completed within the time allotted.

Addresses before the full membership were limited to four lectures delivered on successive days as follows: Prof. G. C. Hugel, French Petroleum Institute, "Recent Progress in the Chemistry of Petroleum and Its Derivitives"; Dr. C. M. Lees, Anglo-Iranian Oil Co. Ltd., "The Oilfields of the Middle East"; Prof. J. J. Broeze, Director of the Royal Dutch/Shell Laboratory at Delft, "Future Aspects of the Application of Fuels and Lubricants"; Dr. E. V. Murphree, President Standard Development Co., "Benefits from Research to the Petroleum Industry."

Although the attendance at the meeting was much larger than had been anticipated when preparations were first undertaken, the organizing committee headed by G. A. Tuyl Schuitemaker, technical adviser to the Royal Dutch/Shell Group, and with a membership drawn from the technical staffs of all the principal oil companies operating in the Netherlands, did its work so well that the convention program was carried through without the slightest hitch, and the committee was warmly praised for its efficiency by the veterans of other scientific gatherings. The elaborate schedule of events was followed with precision, each meeting beginning promptly and ending at the time specified, a feature which enabled members to cover much more ground than would have been possible otherwise.

The Third Congress received a measure of official

Prince Bernhard, patron of the Congress, accompanied by Jhr. O.C.A. van Lidth de Juede, president, entering the Ridderzall for the formal opening of the Congress.

recognition unusual for a gathering of scientists and technicians. The tone for the meeting was set by the impressive formal opening session which was held in the ancient Ridderzaal (Hall of the Knights) which ordinarily is reserved for state affairs of the highest order. It was attended by Prince Bernhard, who acted as Patron of the Congress, and was addressed by Prof. J. R. M. van den Brink, Minister of Economic Affairs of the Netherlands, who dwelt upon the international character of the petroleum industry and praised its members for the example they have set to other industrial groups by their devotion to research and by the free exchange of ideas and information which has become their practice. This initial keynote was maintained and emphasized by the official receptions arranged by the Netherlands government by the Burgomaster and Municipal Council of The Hague and by the gracious gesture of the Queen in receiving and entertaining the officers of the Congress at the Royal residence.

G. A. Tuyl Schuitemaker, (at left) chairman of the organizing committee of the Congress, and Jhr. H. G. A. Quarles van Ufford of the press committee.

E. V. Murphree of Standard Oil Development Co., who was elected president of the permanent council at the close of the recent meeting.

H. M. Queen Juliana of the Netherlands, receiving officials of the Third World Petroleum Congress in her garden.

Prof. J. R. M. van den Brink, minister of economic affairs of The Netherlands, delivering the opening speech as the Congress convened.

While these honors and courtesies imparted a special atmosphere of dignity to the Congress, they did not interfere to any degree with its serious proceedings or with the entertainment of its members, for whom the hospitable Hollanders provided a succession of social affairs and excursions to different parts of the country, including visits both to important industrial developments and to the historic and picturesque features which attract a yearly increasing throng of visitors to the Netherlands. A special Ladies' Committee under the energetic direction of Mrs. B. Th. W. van Hasselt, wife of the Managing Director of the Royal Dutch/Shell, provided a program full of interest for the 650 women who attended the Congress.

While it is impossible in the space of a brief comment to include an adequate summary of the many subjects discussed or even to assess the relative importance of the various topical divisions, the dominating impression drawn from the sectional meetings was the serious desire of those in atendance to learn as much as possible from the ideas and experience of fellow workers in other lands. There was a lively interest, for example, and a keen demand for copies of papers on catalytic cracking and reforming—sections in which most of the papers were presented by Americans—on the part of delegates from Europe and from other countries in which catalytic methods are beginning to be widely introduced. On the production side, particular interest was displayed by delegates in reservoir engineering, which General Thompson in a preliminary talk designated as presenting the most important problems before this branch of the industry, and in the application of improved methods of well measurement and drilling control.

Explanation of the special effort and attention directed by the oil industry to technological progress and justification for the expenditure devoted to it were well summarized by Dr. E. V. Murphree of Standard Development Co. in the final lecture before the Congress. He pointed out that in the past twenty-five years the outlay for research in the United States had risen from perhaps $1,500,000 annually to more than $100,000,000, a rise of some 700 percent, while the personnel engaged in research has been multiplied more than thirtyfold. In other countries the growth has been on a similar scale in proportion to the extent of their petroleum activities.

Largely as a result of these studies and experiments, much additional oil has been discovered, and the industry's ability to find new deposits has been greatly improved. Great savings have been made in the investment required to develop oil fields efficiently. In the processing division research has accelerated the demand for petroleum products and has contributed to the constantly growing number of new products as is evidenced at present by the rapid expansion taking place in the petroleum chemical field.

In bidding farewell to the Third Petroleum Congress, it is safe to say that everyone who attended it has taken with him a recognition of knowledge gained and a better appreciation of the oil industry's vital place in the world of today, as well as the memory of a pleasant sojourn in a delightful land.

(Please turn to page 54)

Executives Discuss Iranian Situation

EXECUTIVES of two large oil companies in the United States recently have made public statements dealing with the problems raised by the nationalization in Persia. Both took the view that capital can hardly be interested in developing foreign oil properties if the normal hazards of a hazardous industry are to be accentuated by risks that contracts with the foreign governments will not be fulfilled.

Eugene Holman, president of The Standard Oil Co. (N. J.), in his annual address to stockholders of the corporation gave that company's creed in its dealings with foreign governments and foreign peoples. He said that,

"Jersey affiliates, like other companies producing oil in other lands, have long recognized that the oil underground belongs to the people of those lands. We provide capital, technical skill, accumulated experience, and marketing outlets necessary to the development of the oil. Without these factors, the oil would be of use to no one—neither the people of the country nor the rest of the world. But with such aid, many people can benefit.

"As we have said many times, we feel that a foreign government which lets oil concessions to private individuals or companies may rightfully expect:

"1. That an adequate participation in the proceeds from the enterprise should accrue to the government.

"2. That operations shall be so conducted as to contribute to the domestic economy of the nation.

"3. That domestic demands for oil be fully satisfied before any oil is exported.

"4. That development and production proceed in an orderly manner with no avoidable waste of the natural resource.

"5. That the enterprise give to local citizens training and employment at fair rates of compensation.

"6. That oil and oil products available for export move to market in fair volume at fair prices.

"On the other side, we believe that the foreign government should assure continuously for the period of the concession to the company:

"1. Security of title to the property or rights conceded.

"2. Managerial control of the company's operations.

"3. The opportunity to make a reasonable profit from the enterprise.

"We certainly do not believe in the breaking of contracts by one party acting solely by itself, nor in the confiscation of property. Business, both domestic and international—and not only business but most of the basic relationships among civilized people—rests on the principles of respect for property rights and the sanctity of contracts. If these principles can be unilaterally violated, the international investment and trade which is required for the economic wellbeing of the peoples of the world will not be forthcoming."

At the annual meeting of the Pennsylvania Grade Crude Oil Association at Pittsburgh, on June 14, Charles L. Harding, director of Socony-Vacuum Oil Co. Inc., devoted most of an address on "Current Middle East Oil Developments" to a discussion of the Iranian situation. His address follows in part:

There are certain implications growing out of the attempted abrogation of contract—implications which, to my mind, reach out beyond this dispute and affect the welfare of all nations and perhaps the future of international conduct.

In many producing countries it is believed that the mere presence of crude petroleum within that country is of itself an item of immediate usability and great value which more or less can be dealt with as a gold coin. You of course know the fallacy of such a view. Crude petroleum has little value in the middle of a desert or up in the mountains. It is only after it has gone through all the steps that transmute it from crude oil to energy and lubricants for the creation of new wealth that it has real value. It is the job of the petroleum industry to convert this article from something almost useless in its natural state to material of value in world commerce. It cannot be repeated too often that the producing countries and the consuming nations are dependent on each other. This is a principle which I believe any country fortunate enough to have oil resources should never forget.

Likewise significant at this time is the fact that the oil reserves of the Middle East are not located entirely within the boundaries of a single nation. They are in fact rather evenly distributed over four or five different areas. This means that no particular source of supply is now indispensable or will be as far ahead as we can see.

The contractual situation with respect to the arrangements between Anglo-Iranian Oil Co. and Iran merits special consideration. The fact that Iran has the only major oil fields in the world in which no American companies have any financial interest may be purely coincidental. The fact that the move in Iran took the form of nationalizing a company more than half-owned by the British Government which has recently been doing a good deal of nationalizing of industries in its own country likewise may have been purely chance. Taken together, however, those coincidences have created a more difficult situation than might otherwise have confronted us. The principles involved are none the less pertinent to all of us.

In 1901 Persia, which as you know is now called Iran, made a concession agreement with the Anglo-Iranian Oil Company to develop and exploit its crude oil reserves. Late in 1932 the Persian Government announced the cancellation of the oil concession under which the company then was operating. The British Government acted vigorously, taking the matter to Geneva in order that it might be dealt with under Article XV of the Covenant by the Council of the League of Nations itself. There was a hearing by the members of the Council sitting around the table in the League of Nations Building.

The then foreign secretary presented the British case with documents and argument. The Persian case was presented by a distinguished French advocate, whom Persia briefed for the purpose. The late Dr. Benes of Czechoslovakia acted as judge. The dispute was amicably settled by the Agreement of 1933 which attached new terms to a concession which was to last for sixty years, till 1993. That new agreement was signed on April 29, 1933, for the Imperial Government of Persia by His Excellency Mr. Taqizadeh, the then Minister of Finance, following its ratification by the MAJLIS or Parliament and the royal assent of the Shah. There can be no question but that it was freely entered into by the Imperial Government of Persia. By it Persia obtained additional advantages of great value. Not only was the rate of royalty increased for the future, but the increased rate was paid retroactively for the year 1931 and 1932, instead of the lower rate previously stipulated. Further, Persia received a lump sum of one million pounds sterling.

Article 21 of the new agreement provided:

"This concession shall not be annulled by the Government and the terms therein contained shall not be altered either by general or special legislation in the future, or by administrative measures or any other acts whatsoever of the executive authorities."

The issue involving the Anglo-Iranian Oil Company in Iran is not primarily that of nationalization. In point of fact the Iranian

Government has always owned the oil reserves. The concession it made with Anglo-Iranian is a contract with the oil company for the development of the country's oil. Thus, as I see it, the present issue is essentially one of abrogation of contract.

Regardless of the legalistic concepts, we must all agree that if sovereign governments are going to abrogate contracts unilaterally whenever it suits their purpose, there will be no basis for international commercial relationships. You men know from your own experience in Bradford, Oil City, Warren, that faith in someone's spoken or written contract is a prerequisite to every business deal. International business is no different. The oil industry of Iran was developed by men and money from another country acting on faith in a contract.

As the new industry developed it became vital not only to the economy of Iran but to other nations which came to rely on it as a source of supply. The question is not merely one affecting Iran alone. Industries and activities vitally affecting the lives and welfare of other peoples have been predicated on this supply of oil.

In the world today we are endeavoring to adopt a higher order of conduct among nations. We are searching for a substitute for armed force that has so often governed in the past. We are contending that the law of the jungle should no longer apply to problems arising among nations any more than it should apply to the problems arising among private persons. This is a higher order of society. It must live by a code of conduct under which rights of nations and individuals engaging in foreign operations are observed. The principles of respect for property rights and the sanctity of contracts are basic in such a code. If the civilized world accepts without protest violation of these principles, the international investment and trade required for the economic well-being of the peoples of the world will be inhibited, and the objectives of the President's Point IV program will be impossible of accomplishment.

Property and contract rights can be and frequently are modified by mutual agreement. The "pound of flesh" approach is not a proper solution to problems which have arisen due to a change in the basic conditions which were present at the time the contract was made. Neither is it a proper remedy for one of the parties unilaterally to disregard his solemn engagement. Where, with the passage of time and the appearance of unforeseen conditions, the carrying out of a contract strictly in accordance with its terms would create undue hardship, it is essential that both parties to the original contract likewise be parties to the changes. To maintain, as some do, that sovereignty includes the right to set aside such contracts unilaterally is not to exalt sovereignty but to put it in a class with minors who likewise are unable to make binding contracts. Nations which have come of age, like individuals who have attained their majority, recognize the practical value of their contractual powers.

If a sovereign is a party to a contract, it can make agreements covering vast interests within its own country. A typical example is the long term oil concession covering the exclusive right to extract oil throughout a country. Under such a contract situations may arise which are clearly contrary to the nation's welfare. Even so, emphasis always should be placed on a proper discharge of contractual obligations fairly entered into. When, however, conditions are so altered as to point to the need for contract modification, it should be undertaken in a friendly atmosphere with both parties seeking a just solution to their problems.

Gradually we have learned that in the case of long term contracts much can be done to guard against such substantial changes in conditions as might make enforcement throughout the contract period inequitable. In this country oil leases generally provide for royalty in kind. The royalty interest thus fluctuates with the value of the oil and more or less with the prosperity of the oil industry. Such contracts have proved reliable and equitable over their entire period.

Another type of arrangement which would seem to offer long term fairness and stability is the so-called 50/50 arrangement which seems to be the pattern now being adopted in some of the foreign concessions where the contract is with a government. Here again, subject to certain agreements with respect to determination of profits, the general objective is to provide that the government shall receive as compensation for its interest in the crude oil removed, half the profits earned by the company within the country. Payment may take different forms, including royalties and taxes, but it again reflects the welfare of the industry, with both parties to the contract, the government as well as the company, gaining or losing revenue with the ups and downs of profits in the industry.

If it be admitted there may be occasions, though few, where contractual obligations should be changed, by what standards are the newer arrangements to be measured? I cannot supply the answer, but I am firmly convinced that most of the problems can be settled by bilateral negotiations provided both the parties to the contract are willing and determined to reach a fair conclusion. This is the pattern that has been followed in the past and is being followed now in respect to some of the concession areas. In undertaking such negotiations due regard should be paid both to past commitments and to existing circumstances. Should there be a complete failure to agree under these conditions—an eventuality hard to see—then I suppose some new authority is required to settle the matter between the parties. Certainly if we are ever to have a world governed by law rather than by force we must come to regard it as no more a limitation on a nation's sovereignty to be required to respect the contracts it has freely made, than we regard it as a limitation on an individual's freedom that he do likewise.

In the field of international relations, I believe the law has not grown to maturity. We are facing new problems and conditions for which rules of conduct have not been completely codified. The common law is a good illustration of a code of conduct under similar circumstances. As new situations arose, the law expanded to meet the problems but careful attention was paid to past relationships. Progress at times was painfully slow, but in the end the foundations on which our human societies were built were stable and the law did not become stultified.

Governments sometimes act under the name of nationalization in altering or setting aside their contracts. I think this is a failure to recognize true legal concepts. The right of a sovereign power to nationalize is one thing. The right of a sovereign power to make a contract binding on itself is another thing. To assert that the right of a sovereign to nationalize is superior to its right to make a binding contract is pure sophistry—the legal equivalent of an irresistible force meeting an immovable object. There are bound to be situations where the line between the two is rather hazy. But ultimately if we are to carry on commercial transactions between countries, contracts must be adhered to, and governments, as well as private individuals, must prove to be responsible parties.

Even in cases of nationalization where there is no breach of contract, there is a recognized principle that prompt, adequate and effective compensation must be paid. The record of the implementation of this principle has been poor. Perhaps we need a further development and enlargement of it. The matter of ability to respond promptly to the payment of damages should be considered. Payment of a portion of the profits of an enterprise for compensation for its expropriation would seem to me to make a farce of the principle. To pay in the form of government bonds not backed by gold or other valuable consideration, likewise would be a farce.

The problem is a serious one. I doubt we know the answers today. It seems to me, however, that the requirements in this case are fairly clear. Unless some course of conduct can be found governing these contractual relationships I do not see how private capital can continue to be invested abroad. This would defeat our Point IV program and be contrary to much of the effort the Western nations are making to build military and industrial strength in friendly countries.

The greatest hope a small nation has for its own survival is that it can make valid and lasting agreements with large nations. A small nation which denies the sanctity of contracts is undermining the one principle of international conduct which says that the world shall not be ruled by force alone.

Middle East Production

Crude production in Iran during April was 135,000 barrels per day below that in March as a result of disturbances arising from nationalization. This did not cause a general decline in Middle East output, however, as large increases were reported by Saudi Arabia and Kuwait. The general region produced 2,043,900 barrels daily in April compared with 1,993,000 barrels daily in March. Details by countries are shown in the tabulation below:

	Crude Production Barrels Daily	
Country	April	March
Iran	565,000	700,000
Saudi Arabia	695,100	638,900
Kuwait	500,000	375,000
Kirkuk	164,000	162,000
Qatar	46,700	46,000
Bahrein	29,900	30,000
Egypt	42,400	40,300
Turkey	800	800
Total	2,043,900	1,993,000

Complete records of April production in the Middle East are not yet available, but Arabian American Oil Co. has announced that output of Saudi Arabian fields averaged 739,780 barrels daily in April, an increase of 44,700 b/d over March.

Background for Nationalization

An interview with Max Thornburg, war-time petroleum advisor to the United States Department of State, an expert in international oil negotiations who recently has aided Iran in developing its seven-year plan.

by Ruth Sheldon Knowles

WHAT really happened in Iran?

There are some startling answers to that question based on the report of an American oil expert and advisor to the Iranian government, who was so close to events that he was listed to be assassinated by the fanatic murderers of Iranian Prime Minister Razmara.

His facts, together with hitherto unavailable documents, show an entirely different picture than the garbled mixture of British explanations, Iranian hysteria, and American official and press confusion which has been fed piecemeal to the public to date. The story includes such astonishing eyeopeners as:

1. The trouble in Iran was not primarily over oil.
2. Iran did not want to nationalize its oil.
3. Communist influence was not an important factor in bringing about nationalization.
4. The British oil company's method of handling negotiations, although legally correct, was considered arbitrary by the Persians.
5. American foreign policy in this critical world issue was not only non-existent, but the State Department actually informed the Iranian Government that it could not recommend any American as an advisor (advisor—not arbitrator) on nationalization problems who was not acceptable to the British.

It is of vital importance to the oil industry and public to evaluate this drastically different analysis of the Iranian situation. It is more important to know *why* the Iranian situation developed than *what* is happening in Iran as the daily newspaper goes to press—if such a threat to world peace is to be prevented elsewhere, and if constructive action is to be taken in Iran itself.

The American oil expert and advisor to the Iranian government whose experiences and observations shed such new light on the situation is Max Weston Thornburg, petroleum advisor to the United States Department of State during the war, former vice-president of Standard Oil Company of California and The Texas Company merger in charge of its operations in Bahrein, and an outstanding authority on oil concession negotiations.

The classical Persian adventure story about Hajii Baba finds its modern counterpart in Mr. Thornburg, who was made an Emir by old Shaikh Hamad of Bahrein, and given an island in the Persian Gulf where he makes his home. He is a scholar of Middle East history and affairs as well as an engineer and geologist. During the past decade of turbulent readjustments of conditions under which oil companies can operate in foreign countries, Mr. Thornburg has been an advisor to the governments of Venezuela, Mexico, Guatemala and Peru.

For the past five years he has concentrated his activities in the Middle East, having supervised the economic survey of Turkey made by the Twentieth Century Fund, and then as principal consultant to the Iranian government in connection with their seven-year plan and the related reform program. Mr. Thornburg was not retained as an oil advisor to the government, but it was inevitable—due to the dependence of the seven-year plan upon oil royalties for its financing and to his own experience in such matters—that the Iranian government consulted with him in its oil difficulties.

The Iranian explosion was much more likely to have come about—if at all—either through a Russian border incident or a popular revolution against the Iranian government than through difficulties with the British oil company, Mr. Thornburg points out. The government had skillfully stalled any Russian trouble by means of a trade treaty and subsequent jockeying back and forth under it. A popular revolution against the government was being held off by attempts to work out a reform program, the hope of American financial aid and the promise of increased oil royalties.

Iran's desperate need of social reform and liberation from foreign influence is the source of its troubles—not oil. Oil today, of course, is a prime factor in government corruption and the motive for foreign influence—but both Iran's social problems and foreign influence began long before the discovery of oil.

Russian expansionism has been a pressure on Iran—or Persia—since the time of Peter the Great. The British have influenced Persian affairs for 350 years—beginning with the concept of protecting their life line to India. Centuries of despotic, incompetent and corrupt misgovernment by the Persians themselves have kept 98 per cent of the people in misery, disease and ignorance.

The Iranian common people have never benefited materially from the country's 700,000 bbls. daily oil production—with the exception of some 75,000 AIOC workers and their families. Oil royalties have been channeled into the private pockets of a weak, corrupt government. The British have not adequately used their profound political influence on the government to encourage social reform, education or economic and industrial development. As one writer comments, "In 1951, swimming pools and flush toilets for the oil workers make a poor substitute for a long-term policy."

The Iranian peasant is no longer in a mood to passively accept his misery. These people—who have been used to seeing half of their babies die before being weaned—have been told that their miserable condition is not necessary. The Americans, the United Nations and the Russians have been equally emphatic about it. In addition, a small but sincere and hard core of young social reform-minded Iranians have been at work.

This is the reason why, when oil negotiations with AIOC deteriorated to the point where the Iranian government felt compelled to use the threat of "nationalization" to improve their bargaining position—the threat became an actuality. Nobody knew what was meant by "oil nationalization," let alone what it would accomplish—but overnight the slogan swept the country becoming concrete and tangible—the panacea for all that ailed Iran. There was no stopping the violent popular reaction—the first voice raised against it, that of Prime Minister Razmara, was silenced by the assassin's bullet.

A pat explanation and misconception of the nationalization movement is that it is due to communist activities. The writers and newspapermen for whom Iran has been a Mecca recently have overemphasized communist influence. Active working communists in Persia are a very small element. "It would take a gifted communist to plant one new subversive idea in the mind of a Persian peasant," Mr. Thornburg comments. "There is no word in Persian for communism—nor is there any word for democracy or nationalization—but there are plenty of words in Persian for no beans in the pot."

The communist job in Iran is not one of propaganda but simply of organization. Unless the Iranians are helped to help themselves, the communists will unquestionably become more active and will be the ultimate beneficiaries of the whole situation.

The young Shah has been attempting to hold back the threat of communism and to reform his own corrupt government. For the past two years he has been struggling to launch a seven-year program of economic and social development. Unlike almost every other country in the world he did not look to the United States for money or free technical assistance.

At the suggestion of Mr. Thornburg in 1948 he hired Overseas Consultants, Inc., consisting of eleven of America's most outstanding engineering and business management firms, to make a survey and outline his program. Mr. Thornburg served as vice-president of OCI, whose recommendations and plan was described by a FORTUNE magazine survey "as sensible as anything that has yet been written on the development of backward areas."

If this plan could have been put into operation when it was ready the end of 1949 there probably would have been no Iranian explosion—for it was aimed to cure Iran's troubles at their source. But due to Persian politicians

the plan is still confined to the printed pages of a five volume report. The majority of the money which had been allocated for its first year's operation had disappeared like a desert mirage when the time came to use it. It was at that point that the oil negotiations between the government and AIOC became so important and started on their fatal course.

In 1949, AIOC had drawn up a supplementary agreement to its 1933 concession whose intent was to adjust payments to the government to correspond to changes in currency value and oil prices since the war. An initial offer by the company was increased during a year or more of dispute, and finally reached a point where it was acceptable to the government.

There has been great confusion as to why the agreement never went into effect. The company signed it and some 50 million pounds accumulated in the bank in London, earmarked to be paid to the Iranian government in compliance with the terms of the agreement. Much has been made of the point that AIOC's offer came to rest in Persian hands.

However, an examination of the supplementary agreement itself is sufficient to understand why nothing came of it. The agreement's intent, according to its preamble, was to increase royalty payments. This came under the terms of the 1933 concession agreement and would have needed no ratification by Majlis, the Iranian parliament. But the supplementary agreement had a rider—which was a new undertaking, so the company stipulated that the agreement must be ratified.

This new undertaking was the controversial part of the agreement and concerned past obligations incurred or alleged by the government to have been incurred, by the company.

"Claims by the government against the company involved disputes which have extended throughout the 17 years since the 1933 contract was signed," Mr. Thornburg points out. "They introduced issues which had no relation whatsoever to the necessity of adjusting future payments to accord with changed world conditions. Through misinformed or willful exaggeration some of these issues assumed an importance in official and public minds out of all proportion to their merits. Others were correctly regarded by the government as having basic importance in the interpretation of the concession contract."

In regard to these disputed obligations, the company introduced two provisions. First, that the government would be given five million pounds as its due participation in the general reserve accumulated during the 14 years from the beginning of the 1933 contract to the end of 1947. Of this amount, presumably half would have been paid to the government at the expiration of the concession in any case, under the 1933 contract. In return the government would give the company a waiver of other financial claims growing out of the company's past performance under the contract.

Undoubtedly one of the company's strongest reasons for insisting on ratification of the supplementary agreement including waiver of all past claims, was that there was a cloud on the title after 1962, due to the fact that the government claimed the 1933 contract was granted under duress. The company naturally would make every effort to remove even a slight cloud on its title.

(Editor's note: The 1949 contract gave Persia a 20 percent interest in dividends or in amounts transferred to general reserve. The limitation placed by the British Government on all corporate dividends had reduced these and increased the amounts passed to general reserves. It is from these accumulated funds that advances have been made to Persia in anticipation of ratification of the agreement.)

The insistence of the company that these provisions should be included in the supplementary agreement brought the situation to an impasse. The Majlis would not ratify any agreement which washed out all past claims, and which in itself was an entirely separate matter from the adjustment of future payments to correct inequities brought about by world conditions.

As Mr. Thornburg points out, "Claims that are so vaguely defined and so beclouded with prejudice and hostility, cannot be settled merely by publishing a decree that they are hereby settled in favor of the company. They must be held up one at a time, dusted off, turned around so the public can see them—just like auctioning off a rug in the bazaar—and a deal made. If a deal cannot be made, and if the issue is of the type that can be arbitrated then it must go to arbitration. My guess is that few of them would ever take this course. Many of them would fall apart as soon as the sunlight hit them. Until they are put through this treatment, however, the old sores cannot be healed."

A great many of the "old sores" were inconsequential, but others were more serious. For example, the claim that British income tax was incorrectly collected from Iran. When the 1933 concession was signed, the total British income tax paid by the company was only £305,000 and the amount paid to the Iranian government "in lieu of taxes" was £274,000, which practically compensated the government for the British taxes collected. In 1947, on the other hand, the company paid British income tax amounting to £15,000,000 which was "offset" by only £765,000 paid Iran "in lieu of taxes." The Iranian government has estimated that approximately £12,000,000 is due her by way of settlement for British income tax unjustifiably collected. In the Persian view this unilateral British decision to apply a greatly increased income tax to the earnings of the company, completely destroyed the presumed equitability of the original understanding with the government.

Another major claim was based on the assertion that the company sold certain oil products to the British government in large quantities at a price below the usual market price. While the actual figure is not disclosed it has been stated that this price was very far below the market price, thus benefiting the British government at Iran's expense. The Iranian government believed that appropriate compensation to Persia should be made for oil products thus sold.

The fact that the British government is the majority stockholder in the company puts the spotlight on both these claims.

Persian politicians were of the opinion that the company's insistence on linking together the agreement to increase royalties with the waiver of past claims, was an attempt "to force Iran to its knees" because of its desperate need for immediate cash.

The company had made so-called "advances" to the government on its royalties, but cut these off after the Majlis refused to recognize the continued existence of AIOC in Persia. Technically they were advances, as under the 1933 agreement payment on royalties were made at the close of the financial year. On that basis the company could call the payment of currently earned royalty an "advance" and discuss, as it has, whether interest was or was not to be charged.

Mr. Thornburg's explanation of what happened to Iranian thinking is most revealing. "In February," he says, "nationalization was still something to frighten children with. True, some of the more fanatical leaders really wanted to 'nationalize'—whatever that might mean—but most of the responsible deputies and senators as well as men about town were agreed that 'nationalization' was only something to wave at the company while negotiating a revised deal. They knew it would be quite impossible to operate the industry without the company except on a greatly reduced basis, if even that. Many of these more responsible men came to me to ask questions, and I found them entirely reasonable. Their opinions varied widely, as opinions are bound to when they are based on misunderstandings and misinformation, but I am sure that they believed me when I told them, point by point, what they would be up against, technically and commercially, if they really tried to operate the fields and refinery and move the products into a world market dominated by oil companies opposed to a 'nationalized' oil industry.

"I was particularly careful in explaining all these points to the group of younger men, engineers, lawyers and economists with university training who had worked closely with me for several years on the seven-year plan. These men, like the 20 to 30-year age group in almost any western country, represented the 'liberal' movement of the country, using the term to describe those who had picked up certain ideals which are much talked of in the West and who had not yet become bitterly cynical about the chances of achieving these ideals in the East.

"When I returned to Teheran after Razmara's murder, in mid-March, I saw practically all the people around Teheran with whom I have been accustomed to discuss serious affairs, including senators, deputies, business men and the younger men I have spoken of. I was struck at once with the change that had come over their thinking in connection with oil nationalization. Except among particular groups within which I would expect to find a "group" idea, there was no evidence that all these men had fallen victim to the same propaganda or that they were merely repeating popular cliches. In fact there was a normal dispersion of opinion except on one point, namely that the oil industry must be nationalized.

"My first reaction was to go back over the same arguments as before, concerning the practical problems which must be faced. In almost every case, however, I would be told that whatever these difficulties were they must be faced. Leaving aside the wide range of opinion as to how serious these difficulties might be, the main argument was that the time had come for Persia to shake off the grip of the British on her vitals, just as the American colonies had done a couple of hun-

dred years ago. One of them told me that oil nationalization meant to Persia what the Boston Tea Party meant to us—that it was a symbol of release from British domination. Others compared it to Turkey's release from foreign 'capitulations' in Attaturk's time. As for operating the industry after nationalization the argument went that a quarter of a century of operation by the company had produced very little benefit to Persia, aside from the relatively small community of actual employees and those who depended directly upon them.

"Allowing 75,000 employees, they said call it a total of half a million beneficially affected by the company's operations. What about the remaining 16 million of the population who had a right to expect that by now they would have at least begun to feel some benefits in the form of schools, doctors, nurses, disease control programs, country roads, water supplies, etc., which are still as far away as in the days of the Great Kings? To these 16 million people, they said, it would make no difference whether the oil industry operated or not, since they never had any benefit of it. Such royalty as had been received sank quickly into private or patronage pockets, in any case, with no other effect than to maintain British slaves in positions of power. Consequently, why worry now about whether the industry continued to operate without interruption or not? It seemed reasonable that some oil could be sold, even with the maximum opposition from the company or other companies, and surely within a few years there would be a way found to restore a substantial income from the industry even though it might not come at once.

"Release from the British interference in local politics, on the other hand, would become an instant benefit, and Persia would have a chance, which she does not now have, to run her affairs in her own interests and not in Britain's. This turn in the argument struck me as being most significant. These men were not National Front, much less communist."

When even the responsible element of Iranian thinking changed so quickly—it is no wonder that the Iranian masses caught up the battle cry and nationalization became a reality. There was nothing to divert national attention from it. If the country had been receiving its increased oil royalties to put the seven-year plan in operation, if the British and Americans had supported the young Shah in his sincere attempt to reform his corrupt government, a constructive force would have been in operation. Furthermore the idea of nationalization would never have been introduced to become a battle cry.

The question immediately arises—how could the company and the British government have underestimated the situation to such an appalling extent?

(Editor's note: The change in Persian attitude came rapidly with the assassination of Razmara and threats by the Tudeh (outlawed communist party) of a similar fate for anyone who took his job. Mossadeq, who took the premiership practically by default, has been agitating for years against all foreign relationships—British, United States or Russian. The AIOC was a convenient whipping boy, but the movement got out of hand.)

It is understood that the company stated privately that it would not yield to the clamors of "transient" politicians in Iran, because if it did so it could expect their successors to renew the attack upon the company with still additional demands and claims. Also, the directors and other negotiators who dealt with the problem for the company yielded on many points in favor of Iran since the company's first proposal was submitted in early 1949. These men became psychologically resistant and even hostile toward any further concessions in Iran's favor.

Many factors contributed toward a feeling on the British part that it was futile to reach a well reasoned and secure agreement with the Iranian government. Chief among these were the frequent changes in government re-

Max Weston Thornburg joined Standard Oil Company of California at the close of his military service in World War I. He rose from engineer and craftsman to chief engineer of refineries for Standard to become manager of the Richmond refinery and chairman of the engineering board. In 1936 he was made vice president in charge of relations with foreign governments of California Texas Oil Co., Ltd. He was in charge of Bahrein Petroleum Co. operations and was one of the first non-Arabs to explore the interior of Saudi Arabia and the shore of the Persian Gulf where Arabian American Oil Company since has developed important producing fields.

sulting in uncertainty that a viewpoint expressed one month would continue to be accepted the next, the lack of technical understanding of many of the points involved on the part of government officials taking part in the discussions, and the general misinformed, prejudiced and irresponsible speeches, newspaper articles and other statements which inflamed public opinion unfavorably toward any reasonable solution. These were all reasons why the British found it difficult to modify their position.

The most significant point, however, was that the British, both company and government, were always one jump behind the critical action—consequently nothing they did was decisive. By the time they had made a few concessions in the supplementary concession, the Iranian government had moved ahead in its thinking to some sort of 50-50 deal. By the time the company made its 50-50 offer, the Iranian Petroleum Commission had recommended and the Majlis was about to enact the resolution for nationalization.

When nationalization occurred it was too late to discuss the sanctity of contracts. An immediate recognition of nationalization would undoubtedly have resulted in the company continuing its operations under some sort of 50-50 arrangement of profit sharing, without even a shilling changing hands. Mr. Thornburg points out that no one in Iran had any idea of how implementation of nationalization could be carried out and that the Iranians would undoubtedly have considered setting an indemnification price at any agreed amount and promptly leased the operation of the properties to AIOC for the same amount—with the terms of the lease on the basis of a new 50-50 concession.

Whether or not any such favorable terms can now be worked out remains to be seen—but as the past shows, delays are bound to be costly to both the company and Iran.

Mr. Thornburg's recommendations to the Iranian Government both before and after nationalization strongly emphasized that the government must find a way to have AIOC continue with the operation. This was, and is, the only sensible procedure, in his opinion.

Where was American foreign policy when all this was going on? What role did it or didn't it play?

The United States has had a direct interest in the Midle East since the mid-twenties when Charles Evans Hughes won participation for America in the Iraq development. That interest has become greatly magnified by its leadership in the movement to contain the spread of communism in which oil is a primary factor. Traditional aversion of the United States to intervention in affairs of foreign governments has prevented even an analysis of what should be done, if anything, to support any Iranian objectives.

If the AIOC-Iranian government dispute had been simply a private matter between a commercial oil company and another government, then we would logically have had no interest. But as a threat to world peace the situation far transcends that. American Middle East oil holdings outside Persia are of great importance and furthermore, world oil production is in such delicate balance that closing down of the Abadan refinery can even bring up the question of the necessity of gasoline rationing in the United States.

American foreign policy during the final stages before nationalization was of the "let them stew in their own juice" variety. Assistant Secretary of State George McGhee, in charge of Middle East affairs, was on an extended tour of the Middle East and India, in March and April during the height of nationalization, and spent only one day in Persia.

Typical of the State Department attitude was what happened to Mr. Thornburg. Immediately after nationalization, the Iranian government asked him to be its advisor in working out a nationalization policy as he was the one person upon whom all controversial elements within the government could agree and had confidence in. Mr. Thornburg advised American Ambassador Grady of this request, but the ambassador told him that unless he was acceptable to the British he did not feel Mr. Thornburg could be useful in such a capacity. He further stated that he had spoken to the British ambassador about Mr. Thornburg and while the British ambassador had evaded a direct answer he had given the clear impression that Mr. Thornburg would not be acceptable to the British. The American ambassador felt that Mr. Thornburg

(Please turn to page 58)

Accelerated consolidation of shoreline sediments for low cost tankage foundations is accomplished by installing sand drains and applying pressure with overload fill.

Fig. 1—Sand blanket in place. Drains driven and area receiving overload.

Storage Tanks On Sand Drains

By Worth H. Franklin*
and
George R. Halton**

THE variegated shale and sandstone pages of Geology's history book reveal a constant theme: soft to hard in a million years or more. We find the hard, stable end products of the process usually many miles inland or occurring at inconvenient depths. The soft unstable initial phase prevails along waterfronts and in backshore areas.

The muds, silts and loose sands so common to coastal regions and deep rivers have a million-year rock-potential and a hundred century firmness-probability. But the immediate waterfront needs of industry must be met, and the economical advantages of water transportation are usually attained at the expense of costly foundations. Large petroleum installations such as refineries and terminals are particularly subject to the subsurface difficulties which abound in marginal land.

George R. Halton, is a consulting engineer at Newark, N. J., who specializes in foundations. He has done work for highway and railroad projects and others. Included among his clients has been Tidewater Associated Oil Co. ←

Worth H. Franklin, assistant vice president of Tankport Terminals, Inc., has performed engineering services for the research and development division of Socony-Vacuum Oil Co. and was a petroleum inspector for the United States Navy. →

Conventional shoreline construction circumvents the soft, pliable sediments by various devices: piles (or caissons) may be installed to extend beyond the depth of unstable ground; friction piles may be driven; muck may be excavated and replaced by a continuous pillar of suitable backfill material. Half measures such as inadequate mats or laterally restraining sheeting or curtains usually entail excessive maintenance costs.

The method of foundation soil treatment described in this article neither bypasses nor removes the mud. Instead, the hardening effect which requires centuries of slow drainage under increasing pressure in nature's process is attained by an accelerated discharge of water squeezed out through sand drains under the pressure of an artificial overload fill.

Tankport Terminals, Inc., a public marine warehouse for bulk liquids in Jersey City, N. J., first considered the application of this system of accelerated consolidation to its foundation problems about a year and a half ago, when the anticipated needs of independent and major oil companies and chemical companies warranted additional storage. The capacity of the tank to be built was influenced considerably by the trend in tanker tonnage, which had increased from a modest 80,000 barrels to the 125,000 barrels of T-2 tankers built during World War II, followed by a few craft of 200,000 barrels and more recently by several super vessels of 300,000-barrel capacity. Accordingly, a 150,000-barrel tank was contemplated which, with two 96,000-barrel units that had been put into service not long before, could receive the larger cargoes without sacrificing product flexibility.

Rupert R. Lewis, president of Tankport, and assistant vice president Worth H. Franklin, engineer for the company, made preliminary estimates of the comparative economy of building the new tank on apparently stable, nearby land available for purchase as against utilizing company-owned, conveniently located, but unstable ground. When the answer appeared to hinge on the cost of counteracting unfavorable soil, the services of O. J. Porter & Co. were sought. George R. Halton of the Porter Co. supervised the subsurface investigation and design, with Russell S. Bodwell directing the field and laboratory work. The cost estimates and construction schedules showed that the sand drain-overload system of stabilization on the company-owned land was superior.

The die was cast. Plans and specifications were drawn and bids were advertised.

The vertical sand drains were installed by George M. Brewster & Son, of Bogota, N. J., experienced contractors in this field. Earthwork was undertaken by Wm. C. Reppenhagen of Jersey City, well-known Hudson County contractor. Tank steel and erection were furnished by the Hammond Iron Works, Warren, Pa.

Others participating in the various phases of the work were: Revegno-Hall, Bayonne,

*Assistant vice president, Tankport Terminals Inc., Newark, New Jersey.
**Consulting Engineer, Newark, New Jersey.

Fig. 2—Settlement platforms. Gages are in box in foreground.

Fig. 3—Finished base. Pressure gages are in foreground.

Fig. 4—Fill in place—adjusted and just prior to removal.

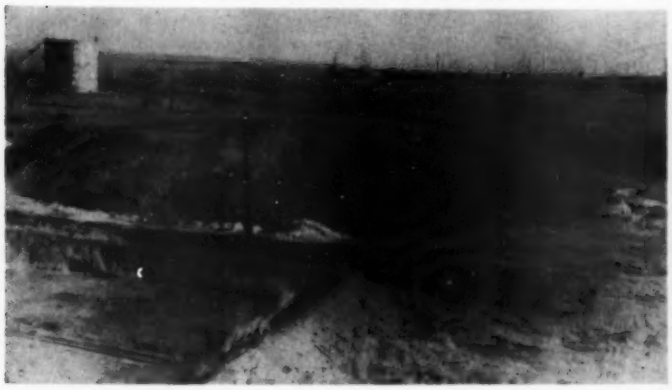


Fig. 5—Finished and tested tanks.

N. J. (sand-blanket); Colacurcio & McComb, Jersey City, N. J. (grading-sub); N. J. Asphalt & Paving Co., Jersey City, N. J. (overload removal); Tankport personnel (tank base grading, drainage, water testing); E. W. Saybolt, Elizabeth, N. J. (calibration); E. R. Haller, Passaic, N. J. (final inspection).

An interesting sidelight on the fill construction is the nature of the fill material which was a furnace residue from a chrome ore wasting process obtained from the Natural Products Refining Co. of Jersey City. This material consisted chiefly of iron oxide and chrome oxide; numerous other chemical compounds made up the smaller percentage. One interesting feature of this material is its alkalinity, which tends to give it an anti-corrosive property. This fact precluded the use of expensive clay or sand as a final mat. The most important properties were its weight and compactability. From a loose density of about 95 pounds pcf, it attains about 128 pcf under a 12-ton roller in one-foot layers. This served to minimize the yardage hauled.

The success of the project did not hinge on the use of this material, but its properties and proximity did materially reduce the cost of the project. Regular earth fill will suffice in the sand drain-overload system which borrows from Mother Nature the advantage of pressure, not chemical composition.

The approximate nature of the subsurface materials had been indicated by a single boring within the tank area and deduced from earlier borings in the general vicinity. For specific design information, five exploratory borings one inch in diameter and one undisturbed sample boring two inches in diameter were made, with unit weight, water content, blows per foot and field classification of subsoil recorded. The borings showed a surface course of loosely consolidated cinder fill averaging approximately seven feet thick over an organic silty clay averaging about 13 feet thick.

Consolidation tests indicated that 35 to 40 percent compression might be expected under the estimated added load. Permeability and density tests of existing cinder fill and of proposed sand blanket, base and fill materials were also made.

From the above data it appeared that the total settlement to be expected might be as much as five and one half feet. The size of the project did not justify sufficient tests for a more refined settlement prediction based on a statistical analysis, but the specimens selected for consolidation tests were adjudged representative of the softer, more compressible sub-soil encountered in the borings.

Vertical sand drains were to be installed at such spacing that 90 percent of the settlement under the overload would be accomplished in a 90-day stabilization period. Three concentric rings of drains near the periphery of the proposed tank enclosed a central grid pattern of drains. Outer rings of staggered drains beneath the planned fill slope completed the design.

The first lift of fill (Fig. 1) was to consist of free draining sand one foot thick to provide horizontal escape for water squeezed up the drains. Greater thickness was considered unnecessary due to the porosity of the existing cinder fill and the diverging radial pattern of flow. The balance of fill material for the project was to be obtained from the previously mentioned ore waste stockpile, approximately one mile away.

It was planned to compact the better quality of coarse material in the lower half of the fill by means of rollers as well as loaded trucks. Other fill material was to be compacted by random routing of loaded equipment.

In preparing the estimates of costs, it was recognized that favorable prices for some of the items would depend on the timing of construction. This was especially true of the sand drain installations, due to large amount of sand drain work contemplated in New Jersey Turnpike construction. In order to save time and take advantage of more favorable bids, separate contracts for sand drains and fill work were planned, with sand blanket to be placed by force account work. This schedule estimated eight months' time to place the tank in service.

The detailed plans for the work were relatively simple once the more difficult tasks of analysis and time calculation were completed. The specifications for the drains followed the customary provisions, permitting alternate methods and equipment, but requiring rapid completion of the installation. The sand drain back-fill material was to be controlled within the free draining, but non-clogging, range of sieve sizes and a minimum diameter of vertical holes was specified.

The fill specifications provided for payment by truck volume of fill brought to the site, with the engineer reserving the right to weigh 10 percent of the truck loads for conversion to cubic yards, as a check on truck

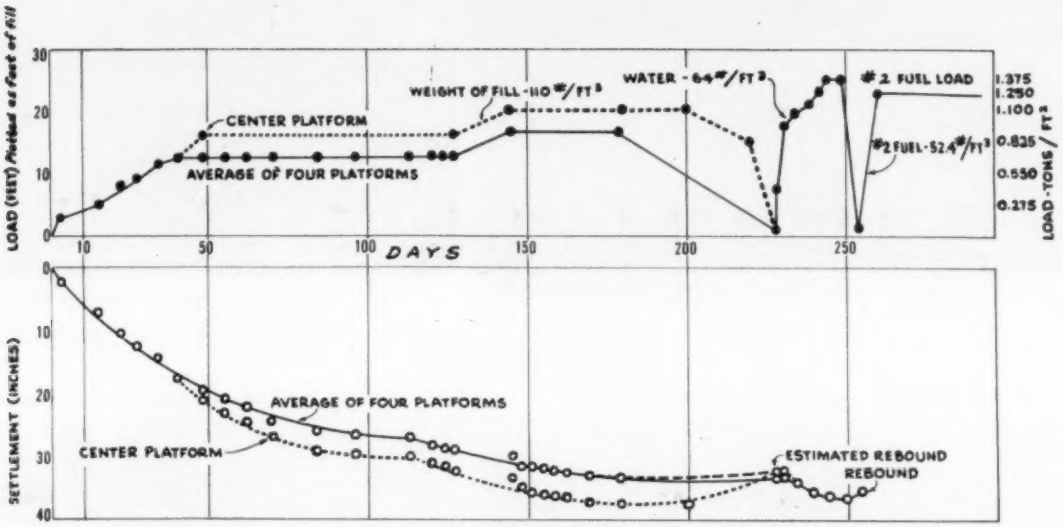


Chart showing progress of settlement and rebound during loading and unloading operations.

volumes. Overload removal quantities were to be determined by in-place measurements before removal. Compaction of the lower half of fill was to be accomplished by either 12-ton pneumatic tired rollers or 12-ton, three wheeled rollers. Sheepsfoot rollers were not specified because of the granular nature of the material.

For stabilization control, five settlement platforms and five pore pressure installations were contemplated, with the displacement stakes to be installed as necessary during construction. The purpose of these control devices was to provide factual data of soil performance and to furnish early indications or warnings of any critical conditions or pending failures in the foundation soil during construction.

While waiting for bids for the sand drain work a one-foot sand blanket was placed to enhance the escape path for water. A few days later an 80-ton speed crane with 16-inch mandrel, special leads, sand skip, air hammer and air compressors moved in to place the drains. A total of 425 vertical sand drains was installed according to the design pattern. The drains were driven through the soft compressible material and into the underlying silt and sand stratum where increased resistance was noticeable. This varied over the area from 16 feet to 22 feet. The closed mandrel was then filled with selected sand backfill material, headed with compressed air at 100 psi and withdrawn while the pressure was maintained to insure a continuous column of sand.

Following the completion of the sand drains, control devices were installed. These consisted of five settlement platforms, and five well-point-Bourdon gauge devices. Settlement platforms, one at the center and four on compass points 75 feet from the center, were placed with pipe risers which were extended through the fill as work progressed.

Three well points were placed in the center at predetermined depths to record pore pressures at the top, middle, and bottom of the mud stratum. Two were placed near the periphery of the tank to record corresponding mud pressures at that location. Care was taken to drive the well points equally distant from sand drains so that maximum pressures would be recorded. Copper tubing connected the well points to the Bourdon gages which were mounted in a box outside the toe of the proposed fill. (See Fig. II) Since the tests might extend into freezing weather, the tubes were back-filled with kerosine.

With sand blankets, drains and control devices in place, the fill was started. Truck-dumped fill was bulldozer spread in layers approximately one foot thick, and was then subjected to three passes of a 12-ton roller. Careful check was kept on the extent of compaction. Roller compaction, averaging 128 pcf was continued until about half of the fill had been placed. From this point on the fill was compacted by circuitous routing of the vehicles and bulldozer over the entire area. This latter compaction resulted in a unit weight of about 110 pcf or an intermediate value between loosely and densely compacted. Loading continued at about 1,000 cubic yards per day until an embankment with diameters of 210 feet at the toe and 180 feet on top averaged approximately 12 feet in height. At the center a 50 foot circle was built to 17 feet in height.

The overload was placed in various thicknesses to correspond with variations of depth of mud under the area. After the rate of settlement began to decrease (see graph), the records indicated that some sections had settled more than others, but the time rates of settlement were remarkably compatible. However, it appeared that a two to three-inch differential settlement of the warping type might be expected around the periphery of the tank if the overload was removed promptly.

Careful analysis of this phenomena resulted in the decision to shift part of the load and add more fill. This adjustment was made for a twofold purpose, namely, to correct future differential and to speed stabilization. The subsequent net result during the testing period of only one inch differential settlement, and that of the tipping variety, proved that the shift was justified. Had this adjustment of load not been made, the resulting warping differentials could have been serious. See Fig. IV.

The center of the loaded area was kept about five feet above the outer edges. This same contour was preserved in connection with the adjustment mentioned above. The additional load at the center supplied an extra driving force to move the water out toward the toe.

When the settlement data indicated that the rate of movement was slowing considerably and that future warping differentials had been probably eliminated, it was decided to remove the overload. The overload fill was rehandled by a one-yard shovel, with trucks hauling it into position for the firewall construction. The manner of removal permitted the full load to remain in the center for a maximum time. Unfortunately, it was not practical to protect the settlement stakes and as a result rebound figures on fill removal were not accurate. The interpreted data indicated, however, that the rebound amounted to about two inches and was uniform.

In addition to the three feet of fill which sank into the ground, the general area was elevated about one foot above the original ground elevation. The approximate grade was obtained with a bulldozer and road grader. The extent of compaction of the material used made grading a very difficult operation. The final grade was struck off by hand labor. String levels were installed on stakes which had been set with a transit to provide for a specified six inch crown. The tank bottom plates were to rest on the base material, but due to the extreme hardness it was decided to spread a ring of sand about three feet wide on radii of 73½ feet and 76½ feet respectively. The thickness of this sand strip was about one inch and its purpose was to facilitate final leveling after the first tank ring was erected. Fortunately, the base leveling operation was so perfect that no final leveling had to be done on the tank. The

variation level was within one quarter inch in the 470-foot circumference. (Fig. III).

The actual erection of the tank took about five weeks (Fig. V). This phase was considerably shortened as a result of having a nearly perfect bottom grade. As a rule, the last sheet placed in the second ring gives considerable trouble, particularly if the base is not level. As was stated above, our level was within one quarter inch on the first ring, and the second ring was closed with no difficulty. It took less than twenty minutes to close this ring, an operation sometimes requiring several days.

Water testing was started the day the tank was finished. No movement was evident until the height of water reached 25 feet. At 29 feet the loading was stopped to observe settlement for 24 hours. Thereafter water was pumped in stages of from three feet to four feet at a time. Suitable time elapsed between stages to show that the settlement rate and pressures were not excessive. This procedure was continued until 42 feet of sea water was in the tank. This height of water represented 110 percent of the full 48 feet of No. 2 fuel oil. The tank was left standing for one hundred hours with this load in it. When the settlement and pressures started to diminish, the water was removed. The total time consumed for water testing was 18 days.

Final results of the water tests showed that only one inch tipping differential developed. The overall settlement was about four inches under this load, which was greater than the service load would be. The accurate rebound data obtained during this phase amounted to slightly more than one inch and was very uniform. It can be assumed that part of the measured settlement under the test load was actually re-depressing the first rebound from the fill load. If this assumption is correct, then the actual settlement caused by test load was from two to three inches.

The cost figures for the tank construction above described are very favorable. Because a blanket statement of the total cost of this or any construction project can be either meaningless or misleading, a breakdown and comparison of the cost factors involved in the sand drain overload system and in conventional methods is not given.

Where the foundation construction consists of piles driven to a predetermined load bearing capacity, which may be obtained by skin friction, point bearing, or both, the length of individual piles is greater than the depth of the soft compressible materials. On the other hand vertical sand drains need only extend through the compressible strata. It is apparent, therefore, that the individual length of sand drains may be only 50 percent of the individual length of piling.

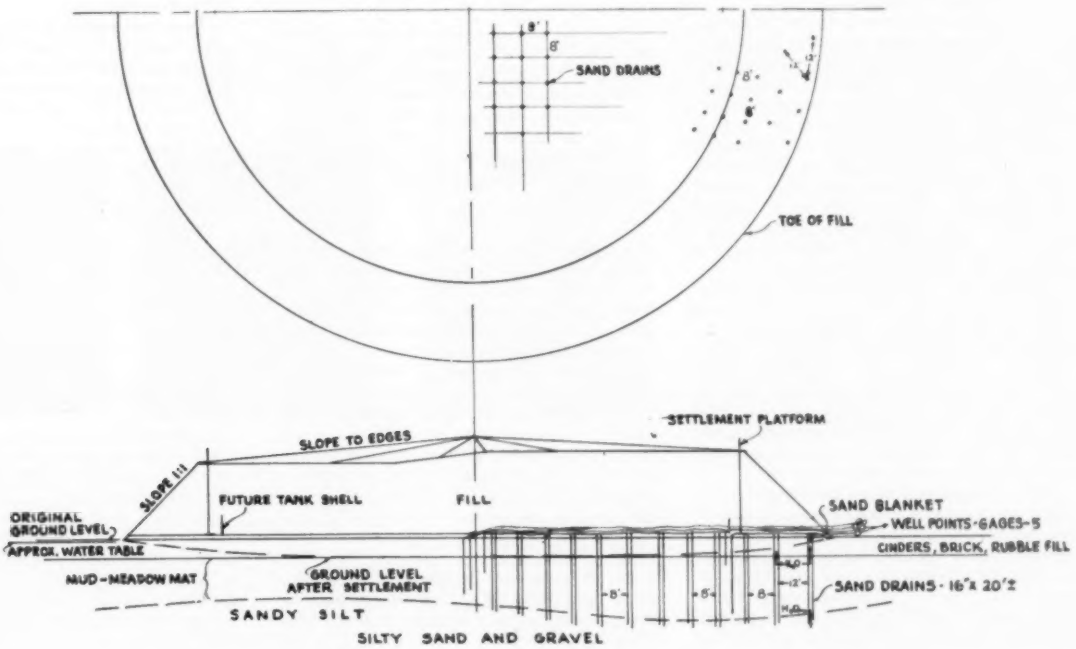
The spacing of piles is a function of their individual load bearing capacity and the total load to be supported. Wooden piles are seldom spaced more than four feet apart. The spacing of vertical sand drains depends on the type of mud, the time allowable, the ratio of contemplated overload to service load and several other factors. Their spacing may vary from five feet to as much as 15 feet apart. Because the total number of piles or sand drains is a function of the square of the spacing, it may be seen that the total number of sand drains on, say, eight-foot centers is only 25 percent of the number of piles required at four-foot centers. The total footage of sand drains would be only about one-eighth of the footage of piling, due to the greater individual length of the piles.

In addition to this difference in the total footage, the cost of the material used in the two methods is an important factor. Untreated timber, the cheapest piling, usually involved the additional expense of excavation and cut-off at low water. With this cut-off expense included, the price per lineal foot of timber is about double that of the unit price of sand drains. Thus the total cost of sand drain footage is ten percent that of pile footage.

In comparing the cost of base and overload fill under the sand drain system as against the cost of a concrete mat where piling is used, some allowance must be made for the cost of firewalls. Where piles are used the cost of firewalls is an added item, but under the sand drain system their construction is an integral part of the overload removal. An equitable method of comparing costs under the two systems is to consider cost of a concrete mat under the piling method of support as comparable to three items of cost under the sand drain system; (1) the cost of base and fill material not removed, (2) the initial and rehandling costs of overload in excess of that needed for firewalls and (3) the cost of the firewall portion of the overload.

Although the quantity of base and fill material required for sand drain stabilization may be from 30 to 40 times the volume of the concrete required in a mat, the unit cost of fill is usually less than 1/40 that of reinforced concrete, where the area treated is larger than ten thousand square feet. From the standpoint of total cost of project, the cost of base and fill could afford to be considerably more than the cost of the mat due to the great difference in cost between sand drains and piling.

Although the sand drain application was highly successful for the particular soil conditions encountered, it is not presumed that the system described is a cure-all for any and all subsurface situations. Nevertheless, the principles of soil behavior observed in the Tankport project indicate that proper engineering analysis of many widely divergent foundation conditions can result in substantial economy and double-checked safety under the described procedure.



Plan and elevation of sand drains and fill. Sketch is not drawn to scale.

Segment Oil Suits to Be Prosecuted In Justice Department Campaign

Washington

By Joseph Huttlinger

DESPITE the emergency, the Department of Justice says it will go ahead with antitrust prosecutions against the oil industry. Attorney General J. Howard McGrath put this on the record as he announced dismissal June 6 of the "Mother Hubbard" suit, most extensive antitrust ever filed against the oil industry.

Dropping of the suit had been expected since shortly after the close of the last war, the Department of Justice decided that new suits against segments of the industry would be easier to prosecute. When it was filed on Sept. 30, 1940, the big case had 367 defendants, including 21 majors and the American Petroleum Institute. One joke sprang up that no courtroom was large enough to hold them all.

Forcing the dismissal was a petition to the U. S. Supreme Court in May from seven West Coast oil companies defending themselves against one of the segment suits of the Justice Department. They asked to be relieved of one or other of the suits, and the government had 30 days to answer. The dismissal way, for all practical purposes, the reply.

A surprise came, however, in the Attorney General's statement, that he is continuing his antitrust activity against the industry. At this time, all branches of the American oil industry are operating at capacity levels, or near there, with defense officials urging far more development of crude reserves and much higher refining capacities.

The present expansion program is similar to that which got under way after World War II began. Then, the Justice Department suspended prosecution, as McGrath explained in his statement, so that "the litigation should not interfere with the war program."

The new suits filed since the war which now are to be pressed carry out the idea of the "Mother Hubbard" case, against a number of companies. Included are suits against Standard Oil Co. (Calif.), and Standard Stations, Inc., against Richfield Oil Corp., Sun Oil Co., and the seven West Coast firms.

"Investigations have been or will be made," McGrath said in his statement, "of complaints from smaller members of the petroleum industry that common carrier pipelines are not available to them; that thousands of retail outlets are closed to their products; that refining processes are available to them only through patent pools charging excessive royalties; and that supplies of crude oil are controlled by a relatively few companies.

"Other investigations include alleged price fixing arrangements at both the crude oil and finished product levels; misuse of legitimate conservation programs; and denial to independent distributors of access to supplies of petroleum products at prices which would permit their competition with distributors of access to supplies of petroleum products at prices which would permit their competition with distributors controlled by or exclusively handling products of major oil companies."

* * *

Bruce K. Brown, deputy administrator of the Petroleum Administration for Defense, which wants more steel for the oil and gas industry, says pipe lines, storage, refinery and gasoline plants will face severe shortages in the third quarter of this year. He bases the statement on steel allocations under the Controlled Materials Plan.

For these purposes, defense planners are allowing only 960,000 tons, compared with PAD requests for 1.4 million tons, a reduction of a third. This situation has been developing for some time, and has brought sharp clashes between Brown, who sees shortages without adequate steel, and Charles E. Wilson, head of the whole defense set up. At least once the clash broke into the open, when Wilson asked oil and gas men to slow down their steel orders.

Domestic and foreign crude oil producers, however, will make out comparatively well in the fight for steel, if CMP does as well as promised. Third quarter allocations total 351,000 tons of casing and tubing, 21,000 tons of drill pipe, 22,200 tons in a wildcat emergency pool, 13,200 tons for Canada, and 40,000 tons for export. This comes to 450,000 tons for three months, or a monthly rate of 150,000 tons, compared with PAD's request of 157,000 tons.

The total, too, is close to estimates of need of the National Petroleum Council last autumn, although the chairman of the NPC steel committee, Russell B. Brown, who is also counsel of the Independent Petroleum Association of America, says the figure for domestic producers is 12 per cent below the NPC blueprint, and for foreign drilling, 30 per cent greater.

* * *

A new set of oil and gas industry advisory committees to the government, operating under government men as chairmen, may be created in the near future as a result of a White House-level compromise over the future of the National Petroleum Council.

The first such committee may be one on foreign requirements for petroleum products.

The agreement provides that the council "shall continue to function as it has in the past," which means with an industry man as chairman. It also is to become an industry advisory group to the Petroleum Administration for Defense, as well as, at present, to the Oil and Gas Division of the Interior Department.

But in concession to the Justice Department, the council, a four-year-old organization that grew out of the Petroleum Industry War Council of World War II, is curbed. It is not to get into "specific allocations of supplies or materials, or the use of facilities to or among individual units of the petroleum industry." This area is reserved only for "special committees" to be created by Secretary of the Interior Oscar Chapman. These will operate under the Defense Production Act, with restrictions set up by Justice. Specifically, such committees shall have government men as chairmen.

Under the voluntary agreements act of three years ago, the council entered this area of activity to meet oil shortages. Under the Defense act, council members had hoped to do the same, if allocation became necessary.

Decisions yet to be reached include the set up of the new Gas Industry Advisory Council to Secretary Chapman and the PAD, and of district committees of oil men. Bets are, they will bow to Justice regulations. The agreement was reached only after Secretary Chapman and his oil consultant Major J. R. Parten of Houston, Texas, called on President Truman at the White House. It clears the way for naming of new members of the council for the current year, and the election of officers. Odds are that Walter S. Hallanan, prominent Republican, and chairman since the council was formed, again will be elected.

The major part of the oil and gas industry expansion during the defense period is being taken under the stimulus of government tax incentives, a situation which promises to continue for some time.

More than half a billion dollars worth of petroleum refinery construction, all of which started since the defense program got under way, is under certificates of necessity, allowing five-year amortization of most of the cost.

The same will be true for oil and gas pipe lines, which are to receive permission for five-year amortization of 30 per cent of the cost under standards made public by the Petroleum Administration for Defense.

The standards offer five-year amortization for 75 per cent of the cost in the case of natural gasoline plants; 75 per cent for tools, machinery and laboratory equipment; 60 per cent for utilities, including steam, water and power needed in petroleum and gas facilities; 50 per cent for access facilities, including roads, sewers, and fences; 50 per cent for storage facilities; and 15 per cent for office buildings.

Basic refinery expansion is offered a 75 per cent certificate, and refining facilities which promise to have no postwar use are given 100 per cent certificates.

Petroleum production is allowed no tax certificate on the grounds there already is plenty of incentive. Output of production equipment is allowed no certificate, nor are marketing facilities, unless determined necessary for national defense, a situation not appreciated yet by PAD.

Pioneering In Brazilian Refining

By C. E. Paes-Barreto, M. Tarnpoll, L. R. Hill

SEPTEMBER 18, 1950 ushered in a new era in the industrialization of Brazil when the first stream of indigenous Brazilian crude oil was pumped into the first complete refinery ever erected in that country. Located in Mataripe, in the state of Bahia, this refinery was designed and constructed by The M. W. Kellogg Co. in conjunction with its Latin American subsidiary, Kellogg Pan American Corp. and the staff of the Conselho Nacional Do Petroleo, to process 2,500 barrels per stream day of Candeias and Itaparica crude oils.

The selection of the 2,500 barrels per stream day capacity was based on the proven reserves of the Candeias and Itaparica fields which had been developed within the last few years. This capacity was established with the assumption that the refinery would be expanded to a 5,000 barrel crude oil capacity as soon as reserves were increased by the discovery and development of new fields.

The successful completion and operation of the first refinery coupled with the recent exploration and development of the Don Joao field, situated about eight miles from Mataripe, have accelerated the realization of this expansion program. Contracts have recently been completed with The M. W. Kellogg Co. and Kellogg Pan American Corp. for the installation of a duplicate 2,500 barrel plant to be located integrally with the present refinery in Mataripe. This second plant will process 2,500 barrels per stream day of Don Joao crude oil and will have additional facilities for catalytic polymerization and LPG production from the combined gases of the total 5,000 barrel refinery.

In the planning stages of the refinery project, the type of processing to be incorporated into the initial refinery was the subject of considerable study. However, the practical consideration that this would be the first modern refinery in Brazil, and that the primary needs for refined products initially in Brazil are gasoline, kerosine, diesel oil, and fuel oil, confirmed the decision of the Conselho to build a thermal cracking refinery for production of gasoline and distillate oils.

Crude supply for the Mataripe plant is stored in 20,000-barrel tanks before processing.

In accordance with the specifications of the Commissao De Constituicao Da Refinaria Nacional De Petroleo S.A. (R.N.P.) for the Bahia refinery project this combination topping and cracking refinery was designed to process 2,500 barrels per stream day of native Brazilian crude oil having a composite gravity of 31.5° API and consisting of a mixture of Candeias and Itaparica crudes with the following general characteristics:

Gravity - °API	31.5
True Boiling Point Distillation	
5%	240
10%	345
20%	495
30%	625
40%	740
50%	845
60%	950
70%	1050
Sulphur—Wt. %	0.10
B.S. & W. (Cent.) Volume %	1.0
Conradson Carbon—Wt. %	2.8
Pour Point—°F.	95

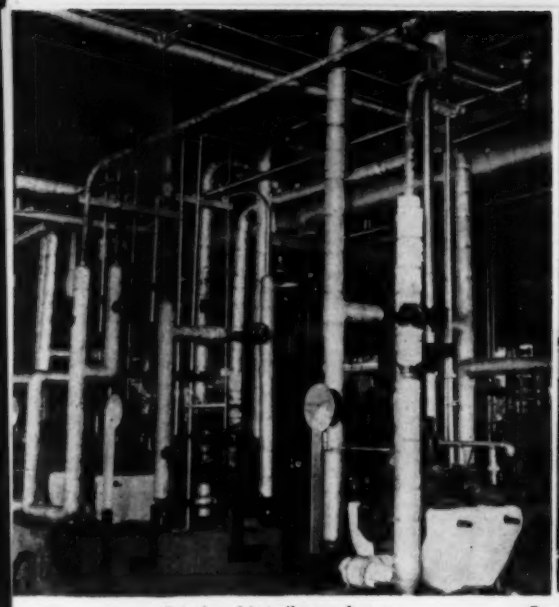
The crude oil mix contains 80 percent Candeias which is obtained through a six inch pipe line from Candeias field and 20 percent Itaparica, obtained by barge from Itaparica Island.

The design of the process plant as a combination unit was dictated by considerations of lowered initial capital investment, de-

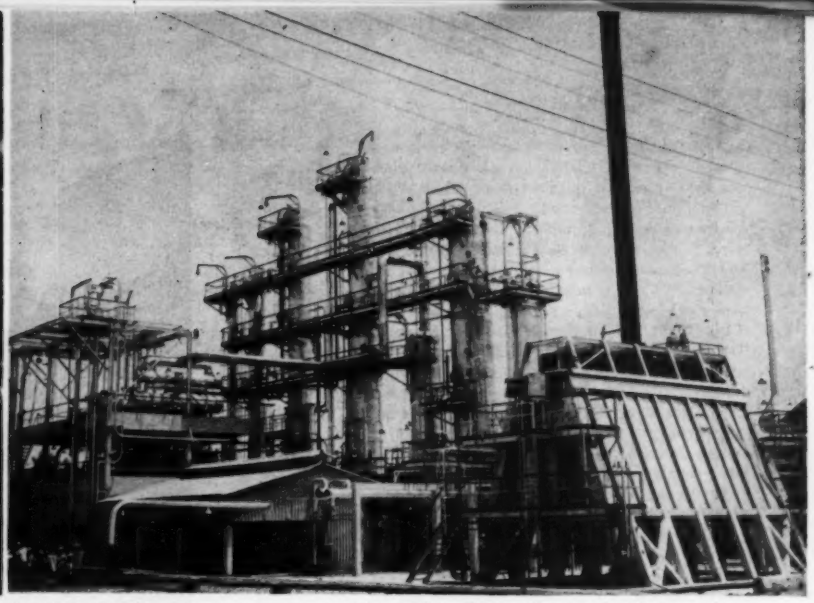
Carlos E. Paes-Barreto, superintendent of the Mataripe refinery, has been engaged in both planning and construction phases of the operation since 1946 when he was appointed executive secretary of the commission charged with building the plant. Following his graduation from Brazil University as a chemical engineer he took a lubricating engineering course and taught inorganic chemistry before joining the National Petroleum Council

M. Tarnpoll, process engineer for M. W. Kellogg Co., has been with the company since 1936 after serving as a control chemist with the Warner-Quinlan refinery. After some years in pilot plant research he was an operator of toluene and hydroforming plants during World War II. For the past six years he has been engaged in designing and helping the operating department starting up new plants in various parts of the world.

Luther R. Hill is the manager of the process department of the M. W. Kellogg Co. He joined the company in 1929 after two years of process engineering at a southwestern refinery. His service for the past 20-odd years has been notable for its diversity because of the many types of processes with which he has been concerned. During the war he was in charge of toluene and hydroforming unit design to which he contributed greatly.



Interior of hot oil pump house.



Combination unit with reforming furnace at right and hot oil pump house in left foreground.

creased operating personnel requirements and lowered operating costs. Processing facilities are incorporated for the following operations: crude oil distillation, naphtha reforming, gas oil cracking, reduced crude visbreaking, gas recovery, gasoline stabilization, caustic washing of gasoline and kerosine, tetraethyl lead blending, and gasoline inhibiting.

In addition to the process plant the refinery is completely equipped and self-sufficient with the attendant facilities of power plant, administration buildings, laboratory, machine shop, warehouse, transfer pump house, tetraethyl lead blending building and loading docks.

Because of the extremely paraffinic nature of the crude oil, as indicated by the high pour test, considerable study was necessary in the design for selection of the processing scheme and operating conditions required to accomplish the desired product distribution. The waxiness of the Candeias crude oil is reflected also in the drilling operations where the wells become plugged and it becomes necessary to clean out as frequently as every two weeks.

The refinery is designed for a well-integrated operation, capable of either ultimate yield production of gas, gasoline and fuel oil, designated as operation "A", or partial yield operation for production of gas, gasoline, kerosine, diesel oil and fuel oil, designated as operation "B". Sufficient flexibility has been incorporated into the design for varying the operations to meet the competitive demands of fluctuating marketing conditions.

The plant operation has been successful from the outset, and actual performance has exceeded by considerable margins all design guarantees with respect to the yields, quality of products, and utilities consumption.

The initial operations of the plant showed the following yields:

	Operation "A" Ultimate Yield	Operation "B" Partial Yield
Gas— Wt. % Crude	12.0	8.9
Gasoline— Volume % Crude	58.6	45.6
Kerosine— Volume % Crude	—	6.2
Diesel Oil— Volume % Crude	—	12.0
Fuel Oil— Volume % Crude	30.9	31.6

Under the conditions of the initial operations, the gasoline produced is stabilized to 10 pounds Reid vapor pressure and has an octane number of 68 CFR-M unleaded. After the addition of 1.1 cc TEL per gallon, the octane number is raised to 75 CFR-M. An octane number specification of 74-75 CFR-M has been arbitrarily established for marketing Mataripe gasoline, which is a quality equal or superior to any gasoline previously marketed in Brazil. The gasoline also has a negligible gum and sulfur content, and is only caustic washed prior to entering storage. Addition of tetraethyl lead and gum inhibitors is done in the finished gasoline storage tank.

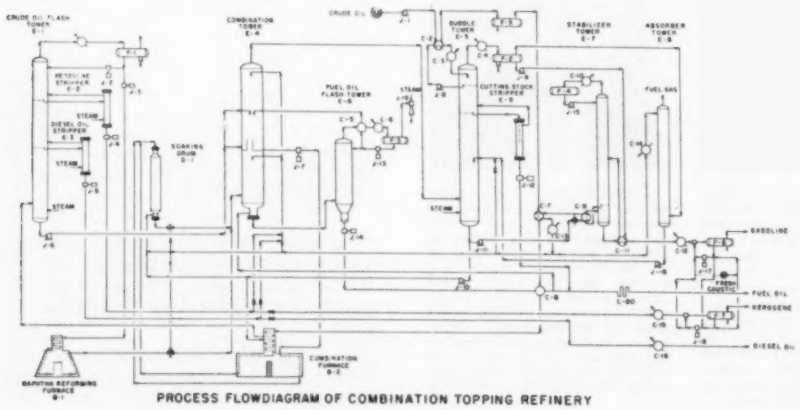
The kerosine and diesel oil are both of excellent quality and appear water-white going to storage. A simple caustic wash is the only treatment provided for these products. The specifications for these products require the following:

	Kerosine	Diesel Oil
Gravity—°API	40 (Min.)	37 (Min.)
ASTM Distillation		
IBP—°F.	350 (Min.)	400 (Min.)
90%—°F.	550 (Max.)	675 (Max.)
Flash Point TAG. C.C.—°F.	115 (Min.)	—
Flash Point P.M. C.C.—°F.	—	150 (Min.)

Originally the diesel oil specifications required a 90 percent distilled point at 625°F.; however this has now been revised upward to 675°F. at 90 percent distilled to meet the specifications of the Brazilian Navy, with an attendant increase in yield.

The fuel oil being produced has a maximum viscosity of 300 seconds Saybolt Furol at 122°F. and has a gravity of 10 to 13°API. A heavy naphtha cutting stock is provided for cutting fuel oil viscosity when required and also provides an external means for reducing the pour point of the fuel oil when necessary. Under any given conditions of visbreaking, the waxiness of the crude oil is reflected in the pour point of the fuel oil.

The technique of operation has progressed considerably since the initial start-up of the plant and the product distribution has become even more favorable than shown in the yield summary for the initial operations. As conditions warrant, the severity of the operation may be increased to produce a greater quantity of higher octane gasoline together with decreased production of low pour test fuel oil.



PROCESS FLOWDIAGRAM OF COMBINATION TOPPING REFINERY

In operation "A", a 400°F. end point naphtha charge for the reforming operation is provided from the crude oil distillation, since all the potential kerosine and diesel oil is to be cracked to ultimate yield. However, in operation "B", where it is desired to produce specified quantities of kerosine and diesel oil, provision has been incorporated to undercut the naphtha reforming charge to 360°F. end point. The naphtha reformer in the combination unit is included in the design to act as a fly-wheel for control of gasoline octane number.

All process pumps are the reciprocating type. The selection of reciprocating pumps was influenced primarily by the location of the refinery and the fact that the maintenance and the supply of spare parts would be more amenable to the facilities at hand. These pumps are driven by 165 psig saturated steam and, with two exceptions, exhaust into a 15 psig low pressure steam main. The two exceptions are the gas oil furnace charge and vis-breaker furnace charge pumps which have a vacuum condenser system.

The cooling water is supplied by circulation of water from the Mataripe River located approximately two hundred yards from the process area. The water is somewhat brackish but no particular difficulties have been experienced in the coolers or condensers.

The furnaces are floor-fired, natural draft and designed for gas firing only. Refinery gas obtained from the stabilizer reflux drum and the absorber tail gas is used for the fuel. Natural gas from the gas wells in the Candeias field is piped into the refinery and is tied into the refinery fuel gas system to cut in automatically in the case of failure or deficiency of the refinery make gas.

The refinery power plant has a rated steam generating capacity of 75,000 pounds per hour of 165 psig saturated steam, and consists of two Babcock and Wilcox boilers each rated for 37,500 pounds per hour steam production together with attendant water treating facilities. Although one boiler is adequate to supply the complete refinery and outside facilities steam requirements, both boilers are being operated in parallel at partial capacities. Exhaust steam from the pumps is condensed and returned to the boilers as feed water. Boiler make-up is piped in from the spring-fed lake some two miles from the refinery. This make-up water undergoes permutite and phosphate treating and deaeration before injection as boiler feed water.

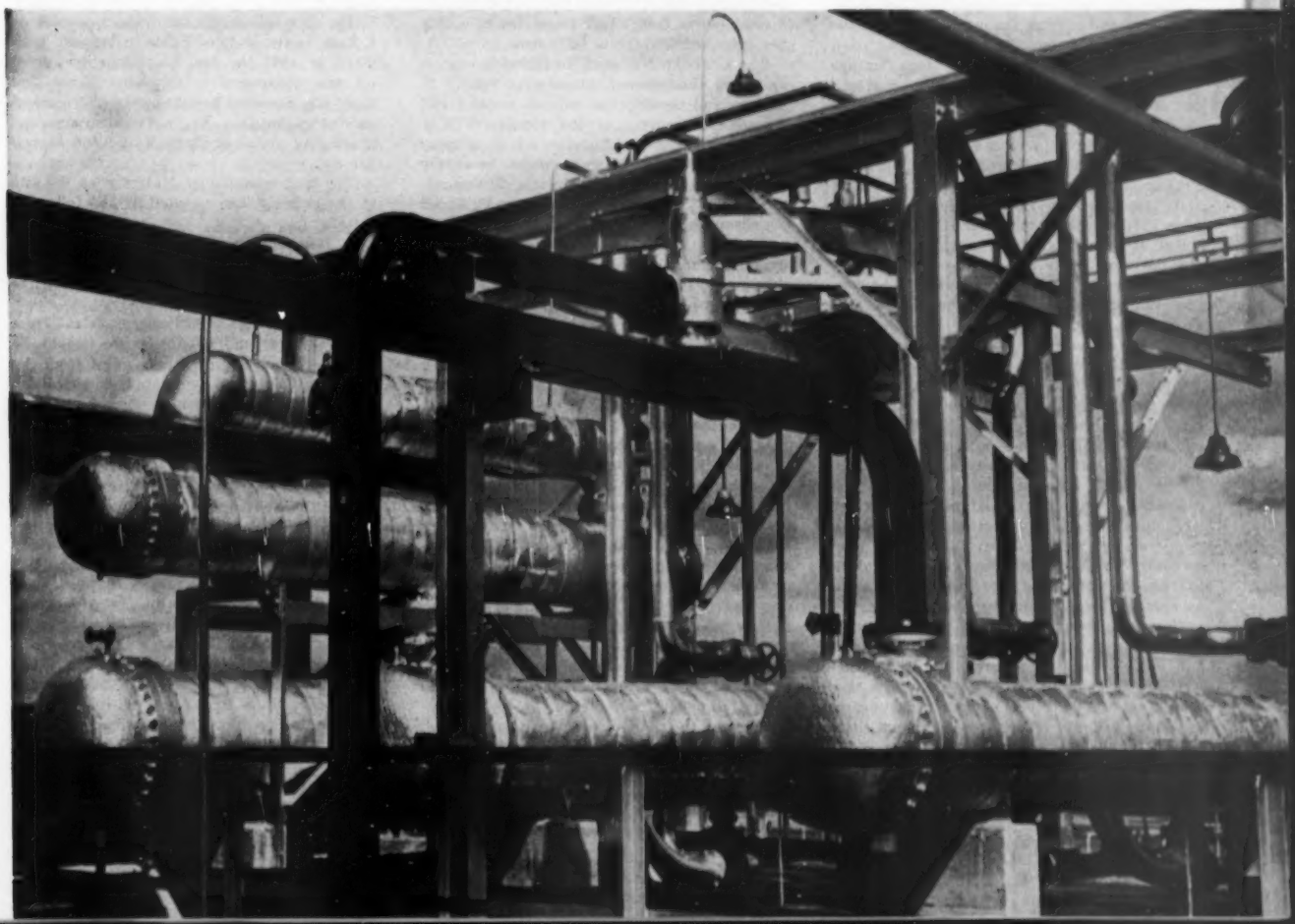
Tankage facilities have been provded for 30 days storage of crude oil and 15 days storage of products in addition to the necessary intermediate and run-down tankage required for operation. The Candeias crude oil enters refinery storage through a six-inch pipe line from Candeias field some two miles distant, while Itaparica crude oil is brought in by barge from Itaparica Island some 14 miles out in Salvador Bay. Products are shipped wholly by water, and in this respect the movement of barges is governed by the tide, which rises to a height of nine feet. Unloading of crude oil and loading of products are restricted to two three-hour periods of high tide daily. Because of insufficient draught near shore, tankers must be anchored about a mile off shore.

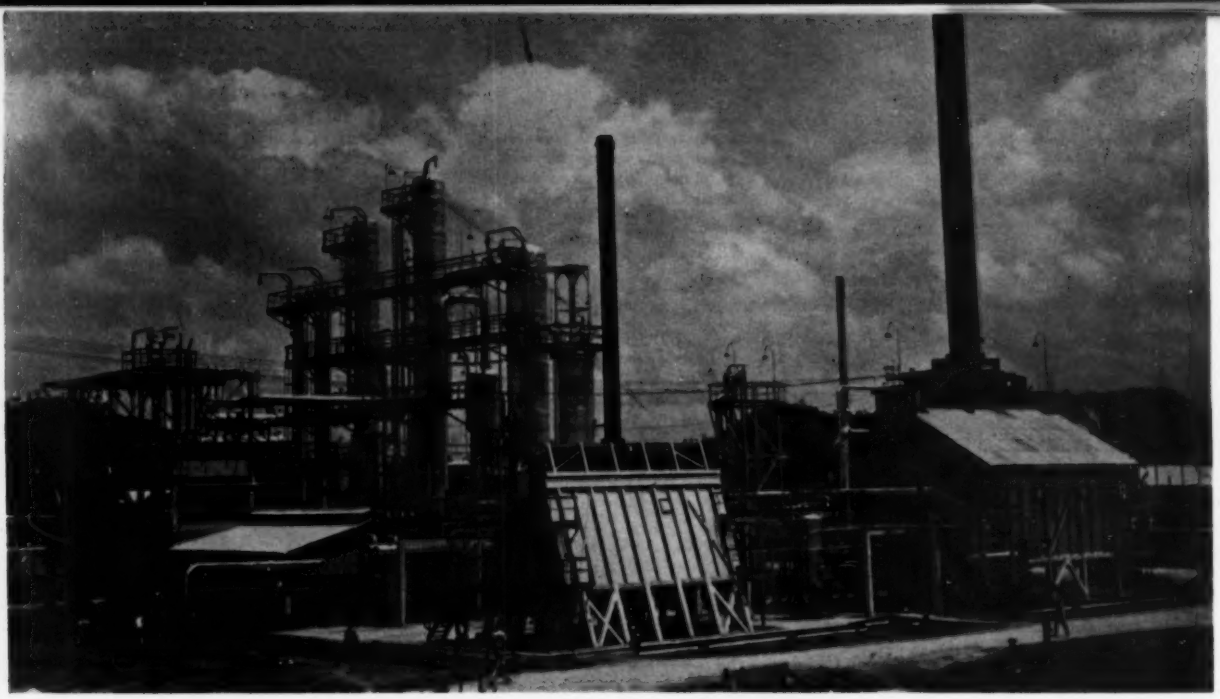
Being the first refinery in Brazil, it was anticipated by the Conselho that the initial operations of the plant would require an educational and training program to provide qualified personnel. Accordingly, selected prospective operating and maintenance men were sent to the United States for a period of six months for training in the offices of The M. W. Kellogg Co., equipment companies and various refineries.

The initial operation of the plant was under the control of the R.N.P. A staff of six operating engineers was provided by Kellogg Pan American Corp. to act in an advisory capacity during the initial operations and until the successful completion of the guarantee test runs. The plant was first started up on Sept. 18, 1950, and test runs were begun in early December. All contractual guarantees were completely fulfilled within ten days and the plant was officially accepted by the Conselho in mid-December 1950.

Process design of the refinery was initiated by The M. W. Kellogg Co. in January 1948 and the refinery site cleared by the end of 1948. Actual construction work was undertaken by the staff of the Conselho under the supervision

General view of process area. Combination furnace at right is used to preheat crude, crack gas oil and visbreak reduced crude. Reforming furnace is at left and fractionating columns in background.





Detail view of condensers with provisions to facilitate servicing.

of Kellogg Pan American Corp. in November 1949 and the plant was completed in ten months being placed on stream in September 1950.

Since the refinery is located in an undeveloped area far from the usual amenities, the project encompassed the establishment of a complete housing development for families of 300 refinery workers. Initially, canteens and barracks were set up for construction workers. In the main, the housing consists of prefabricated four-room cottages with some cottages of masonry. The water supply is piped in two miles from a spring-fed lake. This water, supplied by two diesel-driven pumps, also supplies the boiler feed and drinking water at the refinery. The electric power for the development is supplied by electric generators serving only the community. The construction of this housing development was also completed concurrently with the refinery within the aforementioned construction period.

The entire construction program was accomplished with native labor from Salvador and surrounding areas with some of the skilled labor being brought in from Rio de Janeiro and other points in the south of Brazil. The Kellogg Pan American construction force consisted of 20 men serving in supervisory capacities. Insofar as the Brazilian personnel were unfamiliar with the techniques and skills required for refinery construction, it was necessary in the initial phases of the project to train the workers in the various crafts such as welding, pressure piping, masonry, etc., as applied to refinery construction.

Development of the petroleum exploration and industrialization program in Brazil was initiated approximately 14 years ago with the conception of a petroleum exploration program to tap the hitherto unknown resources of that great land. Brazil is a country of 45,000,000 people with the population concentrated along the North and East on the Atlantic coast. The steady growth and industrialization of the Brazilian cities reflect the technological progress in step with the competitive demands of world commerce. In many respects, and particularly with regard to the supply of petroleum products, Brazil has been dependent upon imports from other countries to supply her consumer and industrial needs.

The Conselho Nacional Do Petroleo was set up as an independent government agency to explore and develop the natural mineral and petroleum resources of the country with a view toward providing a measure of security and self-sufficiency with regard to the supply of critical technological materials. The activities of the Conselho gave rise to an extended petroleum exploration and drilling program in which the aid of American geophysical and drilling companies was enlisted[1]. Since 1937, the geophysical and exploration studies in Brazil have proceeded at a rapid pace and are being extensively continued.

These activities of the Conselho have been incorporated in the five-year plan, or SALTE, which was recently approved by the Brazilian congress. The program, as embodied in this plan, contemplates the completion by the year 1954, of refining capacity in Brazil for approximately 120,000 barrels per day of crude oil as contrasted with Brazil's present daily requirements of approximately 140,000 barrels per day of crude.[1] Whereas at present her daily requirements of petroleum products are supplied by imports provided by major marketers such as Standard Oil Co., Shell Oil Co., The Texas Co., Gulf Oil Co. and Atlantic Refining Co. the completion of this program of refinery expansion would tend to make Brazil substantially independent of any world conditions which might be reflected in curtailment of supplies from abroad.

Although the refinery program is predicated primarily on the use of Venezuelan and other imported crude oils, it is expected that within a reasonable period the discovery of increasing quantities of crude oil in Brazil will reduce to a minimum the quantity of imported crude oil required to fill the nation's refining capacity.

The first oil in Brazil was discovered in Lobato, in the state of Bahia in January 1939. Then in 1941 the first sizeable reservoir of oil was discovered in Candeias. Since that time, the Conselho has developed there a successful exploration, finding natural gas and developing an oil production of 2,500 barrels per day.

The final selection of Mataripe as the site of the refinery was dictated by the following factors:

A. It is two miles distant from the Candeias field. The crude oil could be pumped from the Candeias field to the refinery and the line could be steam-traced completely.

B. It is 14 miles from Itaparica Island from which 20 percent of the crude would be barged. Also it is only eight miles from the Don Joao field which will supply crude oil for future refinery expansion.

C. It is 18 miles by water from the city of Salvador. Products could be sent to Salvador either overland by truck or by water across Salvador Bay. The city is accessible also by railroad.

D. It is about 2½ miles from a spring-fed lake which would supply boiler feed and drinking water and cooling water could be obtained directly from the Mataripe River.

The first 10,000 barrels of Mataripe gasoline "exclusivamente Brasileira" were brought into Rio de Janeiro by tanker on Dec. 15, 1950, and were the occasion for official celebration. The enterprise of building the first "grass roots" refinery in Brazil with all its ramifications from education through final operation represents a major step of the Conselho and the R.N.P. in the industrialization of Brazil and may well be characterized as a commendable achievement.

(1) "Brazil Expands Refining Plans", World Petroleum, January 1951.

Brazil's Future Refinery Plans

UNTIL the recent completion of the Mataripe plant Brazil's refining equipment was limited to a rudimentary installation at Aratu, Bahia, belonging to the National Petroleum Council, and to three skimming plants for the distillation of imported crude, without cracking or polymerisation operations. The Aratu refinery built in 1950 with capacity for 150 barrels daily, provides gasoline, kerosine, diesel and fuel oils for the Council's own services. The three skimming plants belong to Industrias Matarazzo de Energia, S. Paulo; Ipiranga S.A. Campanhia Brasileiro de Petroleos; and Destilaria Rio Grandense de Petroleo, the two last-named being located in Rio Grande do Sul. The capacities of these refineries are 500, 1,200 and 300 b/d respectively, and all produce gasoline, kerosine, diesel and fuel oil. The Ipiranga plant also produces lubricants, gas oil and asphalt. The Companhia Brasileira de Petroleos has recently obtained a loan of 43 million cruzeiros (U.S. $2,365,000) from the Bank of Brazil to amplify its installations.

The Mataripe refinery represents a capital investment equivalent to U.S. $6,875,000. The output is sufficient to meet the present needs of the State of Bahia, but in December 1950 the Petroleum Council signed a contract with the M. W. Kellogg Co. to double the present capacity of 2,500 b/d at a cost of U.S. $5,500,000 in order to supply the requirements of two adjoining states, Alegoas and Sergipe. The work is to be completed by June 1952.

The Candeias field has reserves estimated at 10 million barrels in an area of 1,000 acres. The oil is of paraffin basis (up to 25%) and requires heating in winter for conveyance by pipe line to the refinery. It is found at depths of 2,000 to 3,600 feet below sea level, the principal layer ranging in thickness from 49 to 266 feet.

The reserves of the Itaparica field are estimated at 3.5 million barrels in an area of 187 acres. There are two producing layers. One, of 1½ to 68 feet thick, lies at between 1,700 and 2,200 feet below sea level; the other, beginning at 2,324 feet and reaching to 2,650, has a thickness varying from eight to 58 feet.

In 1949 the Petroleum Council signed agreements with "Cie. de Fives-Lille pour Constructions Mecaniques et Entreprises" and "Schneider et Cie." for the supply of material and equipment for a refinery to process 45,000 b/d of imported crude. At the same time a contract was signed with Panamerican Hydrocarbon Research, Inc. for the project, engineering and supervision of the construction and initial functioning of the plant, which is to be installed at Cubatao, near the port of Santos, and administered by the Federal Union.

The following particulars are supplied by courtesy of the Cubatao Refinery Commission. The processing unit consists of:

a) An electric desalting unit (Petreco Electrosphere).

b) An atmospheric crude unit, with provision for stripping the isopentane fraction for aviation gasoline blending.

c) A visbreaking unit, for thermal cracking of reduced crude into tar and light products. Heaters operate at 300 psi.

d) Gas oil thermal cracking and reforming unit (with separate heaters for heavy gas oil, light gas oil and naphtha), for processing the light products coming from the preceding units. Cracking and reforming are performed at 300 psi.

e) Recovery section, using the compressions-refrigeration system, for stabilization of the liquid overheads from the preceding units, and for recovery of 90 percent of the propylene from the gas feed. H_2S is removed by DEA extraction. A C_3 - C_4 cut is fed into the following unit. The lighter hydrocarbons go into the fuel gas lines.

f) Selective catalytic phosphoric acid polymerization unit, which polymerizes separately a C_3 fraction (yielding a polymer for common gasoline blending) and a C_4 fraction (yielding codimer, which after undergoing hydrogenation, is blended into aviation gasoline).

g) Treating units.

The Cubatao Refinery is planned for a minimum production of the following quantities of derivatives:

	Barrels Daily
Liquid propane	560
Aviation gasoline of 91 octanes	2.250
Ordinary gasoline of 76 octane	15,700
Kerosine	4,500
Diesel oil (No. 2 distillate)	4,500
Fuel oil (Bunker C)	(Not fixed)

The project provides for treatment of crudes from different sources, with the following estimated yields in b/d for each:

		Venezuela	
	Abqaiq	Oficina	Tia Juana
Aviation gasoline	2 250	2,250	2,250
Ordinary gasoline	18,964	19,363	15,750
Kerosine	4,500	4,500	4,500
Diesel oil	4,500	4,500	4,500
Liquid propane	1,650	1,539	1,650
Fuel oil	11,117	11,617	15,269
Totals	42,981	43,769	43,919

As the crude will be carried in national tankers, of which Brazil has 22 building, the annual saving in dollars, corresponding to the difference between the value of the products and the cost of the crude, is estimated at U.S. $31,020,000, U.S. $18,764,460 and U.S. $16,070,670, respectively, in the case of Abqaiq, Oficina and Tia Juana crude. The values of the derivatives produced per day, in U.S. dollars are calculated as follows:

	Abqaiq	Oficina	Tia Juana
Aviation gasoline	15,122	15,122	15,122
Ordinary gasoline	90.258	92,157	74,961
Kerosine	17,327	17,327	17,327
Diesel oil	15,837	15,837	15,837
Liquid propane	8,706	8,120	8,706
Fuel oil	25,502	26,649	35,095
Totals per day:	172,752	175,212	167,049

Equivalent, respectively, to U. S. $57,008,160, $57,819,960 and $55,127,170 per annum.

The site for the Cubatao refinery, covering 235 acres, is now being cleared. It is situated on the railway line between Santos and S. Paulo, adjoining the power station and the terminus of the Santos—S. Paulo pipe line. The plant is expected to begin operating in 1954, and when producing normally will supply 40 percent of the estimated requirements of the domestic market at that date. The capacity of the storage tanks will be 3,100,000 U.S. barrels.

The following projects for two privately owned refineries have also been approved and preliminary work on the sites has been, or is about to be started. The Refinaria de Petroleo do Distrito Federal, now known as the Refinaria de Petroleo de Manguinhos (Drault Ernani group), has signed a contract with the M. W. Kellogg Co. for the construction and installation of a 10,000-barrel refinery at Manguinhos, Rio de Janeiro. The plant is to be delivered in Brazil by June 1952. Another company, the Refinaria e Exploracao de Petroleo Uniao (Soares Sampaio group), has contracted with Hydrocarbon Research, Inc. to supply and install a 20,000-barrel refinery at Capuava in the Municipality of Santo André, San Paulo. The plant is expected to begin operating in 1952. Approval of the contract has been granted subject to an increase of capital from 60 to 300 million cruzeiros before Aug. 1. Both installations are of the thermoform cracking catalytic type, and will process imported crude.

The National Petroleum Council is at present considering two other projects for possible later execution. One of these is for a 40,000-barrel plant to be installed at a point in the State of Rio de Janeiro; the other is for a 45,000-barrel refinery to be mounted at Belem, Para, the Brazilian port nearest to Venezuela, whence the necessary crude would be imported. According to the projects both installations would be state-owned, but in view of the present political trend private initiative, if forthcoming, would probably be welcomed.

M. Rene Navarre, general manager of the French Institute of Petroleum.

The French Institute of Petroleum

By Jacqueline Darrouy*

At the time of the liberation France was assigned, within the frame of the Monnet Plan, a vast program of petroleum development, including on the one hand the reconstruction, modernization and expansion of the refineries and the systems of transport or distribution that were seriously damaged by the war, and on the other hand the prospecting and exploitation of possible oil resources in France and the French Union.

For attaining such objectives an industry must have a personnel that is well trained and kept up to date with the most recent scientific and technical progress.

As an aid in this industrial effort the French Institute of Petroleum was created in 1945 to assemble, coordinate and distribute all information that would be of help in reaching speedy results within the means available and with expansive French participation.

The Institute is a professional body and is supported in the main by an assessment on petroleum products sold on the French market. Its director is assisted by an administrative council at present composed of the director of the French National Petroleum Advanced School, the director of the National Motor School, prominent industrialists, functionaries of large public services, and a representative of the petroleum technologists. The director of Carburants in the Ministry of Industry and Commerce controls this administration in his capacity as governmental commissioner.

The statutes of the Institute specify that it shall:

(1) Provide personnel capable of taking part in the development of new knowledge, the diffusion and application of this knowledge.

(2) Initiate or carry on studies and research that are of interest for the development, in France, of scientific and technical industrial knowledge in the petroleum industry.

(3) Provide documentation for the use of the administration, the industry, and technicians concerning scientific and technical knowledge.

The organization of the Institute will be seen on the accompanying chart.

In the organization of the technical force the department for "formation of staff" takes account of the personnel needs of the enterprises and arranges for recruits from the engineering colleges, vocational schools and drilling schools, appraises their efficiency and adaptability to the needs of the industrial programs.

Two technical schools that train students qualified to work into upper places in the national economic system are the National Petroleum High School and the National Motor School. These schools are open to students coming from the universities and engineering colleges where they have acquired a foundation for careers in science and technology that is judged to be adequate for their success in specialized studies. Their further training is directed to providing general knowledge in fields where they will be especially oriented toward the solution of industrial problems.

The National Petroleum High School was founded in 1924 at the University of Strasburg. Since the founding of the French Petroleum Institute the services of this school which were suspended during occupation have been regrouped at Rueil-Malmaison. The students at the Petroleum High School have a choice between the two principal branches of the petroleum industry: exploration and exploitation of oil fields, and the refining and distribution of petroleum and its derivatives. In either of these two sections they may, according to their aptitudes and the situation existing at the time of their entry into the industry, orient themselves in the first section toward either surface prospecting, deep exploration and exploitation of located fields, or in the second section, toward research in refining and application of products, in the technical operation of refinery equipment, or in promoting the use of petroleum products in consuming industries.

The National Motor School was created in 1935. Here engineers are trained in the basic conceptions of engines and the use of fuels for internal combustion in these engines.

The instruction at the National Petroleum High School and the National Motor School consists in attendance on classes, participation in laboratory demonstrations and especially in the pursuit of individual work in order to establish in the students a taste for original work on a specialized subject and to prepare them for the first steps they will have to take in the line they have selected for their professions.

Inauguration of the plan for petroleum prospecting created an urgent need for personnel specializing in the execution and control of drilling operations. The Institute, therefore immediately opened three drilling schools. For getting these schools started, American experts in the use of modern methods were called in. Two drilling schools were located in Southern France and the third at Sidi-Slimane in Morocco. The students are put to work on full scale equipment and divide their time between brief theoretical instruction and the normal service of a drilling well. The Institute quickly succeeded in obtaining 85 trained drilling foremen.

At present, with immediate needs taken care of, it remains to add to and promote the personnel. Only one drilling school is now in operation (at Sidi Yahia du Rharb) where 29 students are receiving instruction. However, the flexibility of this organization is such that numerous recruits can be added to supply, without delay, the important needs of the industry as they arise.

The training of foremen and supervisors of refinery operations is taken over by the Institut Francais du Petrole. In accordance with needs stated by the operating companies

*Engineer, Institut Francais du Petrole, des Carburants et Lubrificants.

there are short courses of three or four months duration organized for further training of these operatives; apprentices among the junior personnel are further prepared in the refineries by courses which may extend to one year.

Since the creation of the Institute, 398 engineers have been turned out by the National Petroleum High School and 76 by the National Motor School. In five sessions of the operatives schools in 1948 and 1949 a group of 111 foremen were trained. At the present time there are 65 engineering students at the National Petroleum High School and 15 at the National Motor School.

To be efficacious and complete the action of the Institute should not only be directed on the young men but should follow them after their exit from the schools and should extend to those who are actively occupying positions in the industry. To attain this double objective there have been arranged stages of training of engineers and foremen in foreign countries, principally in the United States. Since September, 1947 about 100 engineers and foremen have pursued advanced studies in the oil fields and in refineries, or have been doing individual work at the universities on special problems that are of interest to our industry.

In 1949 the Institute had extended aid to the Association Francaise des Techniciens du Petrole in the organization of a tcchnical seminar on the general theme of "Petroleum, Primary Material for the Chemical Industry." For this seminar men of prominence in the international industry have accepted invitations to deliver lectures. Another feature of the Institute's work is the organization of demonstrations in France on new techniques by foreign specialists.

These are field demonstrations of what may be done in France in seismic prospecting by crews of American specialists, or documentary demonstrations of what may be expected in France and in the territories of the French Union from a study of aerial photographs. In addition, the laboratories of the Institute are open to practicing engineers.

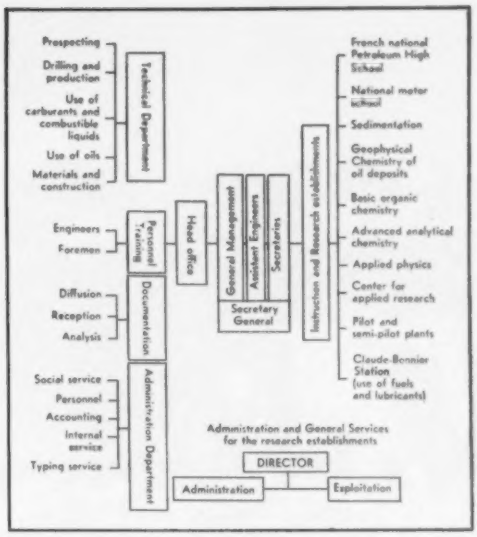
The research division of the Institute specializes in the various branches of scientific research in the service of the petroleum industry. Each has its particular field; the objectives they have in common are:

(1) To introduce into France the modern methods of work which applied science has to offer the prospector and the engineer in the installation of apparatus, conditions of employment and rules for their interpretation; to train specialized personnel, to make preliminary studies on the construction of equipment in France, and to organize a service to take over the working technologies that the industry has neglected.

(2) To offer the students of schools recognized by the Institute the material means and the scientific media necessary in their personal efforts.

(3) To offer engineers the possibility of resident study in the course of their career.

(4) To participate in research projects chosen by the Institute which have for their object (a) to study particular aspects of precisely defined French problems; (b) to make analyses of phenomena which the engineer will have to work over to round out his qualifications; and to pursue original work in certain selected fields.



Organization chart of the French Institute of Petroleum.

The Sedimentation laboratory of the Institute is occupied with techniques to be used in identification of sedimentary rocks, the study of their formation and origins, the phenomena associated with the genesis, migration, and the accumulation of petroleum in these rocks. The Geophysico-Chemical laboratory includes laboratories for the chemical and physical techniques that are used to assist in the location of wells, and to carry on drilling under the best mechanical conditions that will reveal direct or indirect indications of petroleum and, when an oil deposit has been discovered, to study the reservoir rock and the fluids it contains with a view to determine the conditions of operation that will result in the most complete recovery, such as, conditioning the wells, plan of production, with consideration of ultimate application of methods of secondary recovery.

The Laboratory of Basic Organic Chemistry works on groups of projects that are of interest in the study of reactions used in modern refining; studies the relation between the performance of petroleum products and the structures of their constituents.

The Applied Physics Group includes laboratories that deal with physical techniques of use in the study of the physical and chemical properties of substances that lend themselves to the analysis and interpretation of phenomena that accompany the elaboration or the utilization of petroleum products; and make analyses of complex mixtures that will lead to more precise methods of fractionation.

The Analytical Chemistry Laboratory comprises:

(1) The Control Laboratory which makes standardized tests on petroleum products for the needs of the industry.

(2) The Laboratory of Advanced Chemical Analysis undertakes solution of complicated analytical problems and carries out research in organic chemistry that may throw light on these problems.

(3) The Applied Research Center comprises laboratories charged with preforatory studies on the industrial realization of processes, and has a station of reduced models needed for shortening the research necessary to be made in apparatus of a dimension or a nature such as to require a small industrial installation (pilot plant).

(4) The Claude Bonnier National Research Station has the task of research concerning the application of petroleum products to the production of energy by combustion and the conservation of energy by lubrication. These researches are of a basic technical nature on small scale or full size engines.

All laboratories of the Institute have research projects under way and the progress made on these projects is reported daily. It would require too much space to report here a detailed list of these research projects; suffice it to say that they are chosen in close relation with matters that concern the industry.

A Documentation and Studies department supplies the technicians of the industry and the administrations with the most recent publications. It digests or analyzes these documents with the assistance of the engineer of the Institute, reproduces and distributes them. The Library of the Institute now has 2,100 books, 1,200 documents and 900 microfilms on technical and economic subjects in the petroleum industry; it regularly receives 320 French and foreign periodicals and it also publishes the Revue d l'Institut Francaise du Petrole.

In close association with the various initiatives in the three domains of personnel, research and documentations, the Technical Department, composed of specialists in each of the three main branches of the petroleum industry is at the service of the Institute, for advice and assistance in special matters assigned to it.

In conclusion, it may be emphasized that everything originated by the Institute has an industrial bearing. All those associated with its work are expected to have in mind this particular character of its action, because from that standpoint they can best assure the efficiency of its enterprises. That is to say, while the activities of the Institute are comprised in the fields of formation of personnel, research and documentation, neither of these is to be considered as an end in itself.

Experimental crew working in the Edwards Plateau region of Texas.

Continued Research Improves New Exploration Tool

By A. J. Baxter*

SINCE the early days of seismic prospecting in this country, geophysicists have sought to improve the recording and interpretation of seismic waves produced by the discharge of explosives in shot holes. Early work with the refraction method used extremely large charges with the shot-detector located at a distance several times greater than the depth of the horizon of interest. More recently, reflection methods with greatly reduced explosive charges have been employed by the industry.

During this period of some thirty years, most of the experimental work and research efforts have been directed toward improvement in instrumentation. It remained for Dr. Thomas C. Poulter, of Palo Alto, Calif., to approach the problem of improving seismic records by controlling the uniformity of the seismic energy introduced into the ground.

For a number of years, Dr. Poulter has conducted experiments and studies based on the broad assumption that the most effective method of producing a seismic wave for recording reflections would be achieved by detonating the explosive charge above the surface of the ground. So extensive have been Dr. Poulter's studies that the method derived from the research program can no longer be considered a variation of the shot hole technique but actually constitutes a complete system which may radically change virtually all phases of seismic exploration.

It is only natural that any variation of an accepted system on geophysical exploration would be received with a certain skepticism by the industry, and Dr. Poulter's method has been no exception. In many instances, results from hastily prepared and superficial experiments were used to evaluate the method. Also, overly enthusiastic claims by early proponents were not entirely fulfilled, and some members of the geophysical industry attempted to write off the method as another of the doodle-bug variety.

Dr. Poulter submitted his inventions to the Institute of Inventive Research in San Antonio in 1947. Up to that time, he had conducted only preliminary experiments, and it was soon apparent that a long and detailed research program would be required before the method reached commercial proportions. The invention was accepted by the Institute as a project with the usual provision that the inventor would share in a percentage of any royalties resulting from the licensing program.

*Institute of Inventive Research, San Antonio, Texas.

AN APPRECIATION

For several years it has been my privilege to be associated with one of the most fascinating and difficult tasks, the management of inventions. When one has reviewed thousands of ideas and talked to hundreds of inventors, one can appreciate an inventor who quietly assumes the huge task of devising a new method of oil exploration and, far more important, reducing it to a usable tool. Such a man is the originator of this important new seismic method. ——A. J. Baxter.

A. J. Baxter of the Institute of Inventive Research, general manager of the Poulter seismic method for the institute.

Throughout this program, the Institute has taken the position that the industry should be given the benefit of the method and that concurrently an active research program should be carried forward to perfect new techniques, new developments and advancements in field procedure which would be passed on to the users of the method, both in the form of instruction manuals and technical bulletins.

Many investigators have tried to devise a means of developing a sudden downward force upon the surface of the earth as a source of seismic energy, but in all cases the area of application has been so small that the required force was far in excess of that which could be transmitted in the weathered layer without unduly weakening the effective force.

The Poulter Method employs a pattern of explosive charges. The energy leaves the individual explosions in the form of a shock-wave, and a downward force in excess of two million pounds is exerted upon the surface of the ground for each pound of explosive used in the pattern. A seismic wave of high energy is thus produced, but since it is transmitted over a large area, the amplitude is low enough to be readily transmitted by the weathered layer.

In the Mid-Continent area alone, the method has been tried on almost every conceivable surface condition ranging from the sand and gravel areas of the Rio Grande Valley to the limestone surface of the Edwards Plateau and from caliche-covered areas in New Mexico to the gypsum-and-sand-covered lands of Western Oklahoma. Tests have been made with highly satisfactory results over muskeg in the province of Alberta, Canada. The method has also been used over snow-covered areas and good reflections have been obtained with a snow coverage of as much as sixty feet deep.

One of the companies using the method has had a total of six crew-years' experience and reports that quite often the Poulter Method offers the only solution to difficult areas. The chief advantages attributed to the method are: (1) simplicity of records: (2) lack of multiple reflections, and (3) absence of disturbing surface or near-surface energies. It is also this company's experience that these advantages are due to the fact that the method provides ability to control the frequency introduced into the ground.

In early use of the Poulter Method it was found necessary in some areas to use large charges of explosive. Extensive experimentation and careful study of results have provided

Dr. Thomas C. Poulter, inventor and developer of the air-shooting method, checking record of a shot in West Texas.

Typical terrain in Edwards Plateau region in West Texas in which Poulter Seismic Method has been tested.

a great deal of knowledge concerning the basic fundamentals pertaining to the introduction of seismic waves into the ground. More efficient methods have been devised to produce the maximum energy from the discharge of explosives above the ground so that the total amount of explosive required is now from 50 to more than 90 percent less with a parallel improvement in record quality. Use of very small charges permits the seismic crew to employ split spread formations with a lowering of explosive cost and a simultaneous increase in rate of production per day.

Of particular interest is the work of an experimental crew that has been employing the method in the most rugged portions of Texas' Edwards Plateau area. Typical terrain is depicted in illustrations appearing with this article. This particular crew secured more than 400 miles of continuous survey on the plateau and usually employed a pattern of seven charges ranging from five to ten ounces of explosive per charge. Some controversy has arisen recently concerning the most economical method of drilling shot holes in this area since two or three drills are usually required and it is often necessary to employ four drilling rigs. Air shooting completely eliminates this expense and provides maximum portability due to the absence of cumbersome drilling rigs and heavy water trucks. The method further indicates the possibility of complete miniaturization and even greater portability with recording instruments reduced to a fraction of the size of conventional units.

One of the interesting features of the Poulter Method is the almost complete absence of multiple reflections over the portion of the record relating to horizons of interest. Actually, the only multiple reflections to be found are at the very beginning of the record, and ordinarily, these are received prior to arrival of the reflections from the submerged horizon. This enables the usable reflections to be readily detected and greatly faciltates their interpretation.

It will be of interest to briefly mention several of the improvements attributed to the use of the Poulter Method in seismic prospecting. We may summarize these into three classes:

First, the firing of a group of charges in the air sets up a seismic disturbance which is additive as regards the energy directed straight down, but which is self-cancelling as regards the energy which is transmitted off at an angle from the shot area. It may be shown that the energy proceeding away from the shot area is that which gives rise to the multiple reflections from shallow horizons which tend to confuse seismograms employing conventional procedures.

A second improvement brought about by the Poulter Method is that it produces a composite seismic wave which is generally flat over a large portion of its area. This results in a pronounced directive effect and a large portion of the energy is transmitted directly downward into the earth. This causes the reflections from great depths to be at a high level and reduces the background noise.

The third advantage pertains to the energy level at which the pressure is applied to the surface of the ground. The intensity is low but the total area affected is high even though the charges detonated, as has been previously mentioned, may have a weight of only five ounces.

Although the method has been used in the field for a comparatively brief period of time, several structures have been mapped in areas where it was quite difficult or impossible to obtain records by conventional shot hole methods. The earliest survey completed by the method was of the Benedum Field in West Texas. This survey was made at a time when the discovery well had been completed but none of the offset wells were in. It is interesting to note that the surface shooting picture differed appreciably from a previous survey made by conventional methods and even more worthy to note that the surface shooting map was substantially confirmed by subsequent drilling.

Another field located by surface shooting which, although small in area, conforms to the structure map is the El Ebanito Field in Starr County, Texas. More recently, a discovery well was completed on University of Texas lands south of the Benedum Field. This structure was indicated by a surface shooting survey made over a year ago.

A few objections to the method, made during the early periods of its development, have been eliminated. Reduction in the size of the explosive charges has increased the safety factor and reduced the shooting permit problem. The weathering problem is, as a rule, the most difficult one the interpreter is required to solve. But, it should be recalled that weathering problems concerned with surface shooting are similar to those faced by geophysicists early in the days of correlation shooting. With the choice of a suitable method of computation, the problem of weathering during the employment of surface shooting is quite capable of solution, and is being subjected to continued research.

It is recognized that the Poulter Method has limitations, particularly in densely populated area. There remains a great deal of research to be done, and even now a number of techniques are being studied which will undoubtedly contribute much to its efficiency. It is the intention of the Institute to make the results of all such research available to those engaged in the program. To the inventor, Dr. Poulter, the industry owes much for his perseverance and confidence, this enthusiasm and the tireless devotion to the task of giving the petroleum industry a new exploration method.

Poulter method equipment is readily portable over rough terrain in West Texas area.

213 an hour recently

in **7½** hours

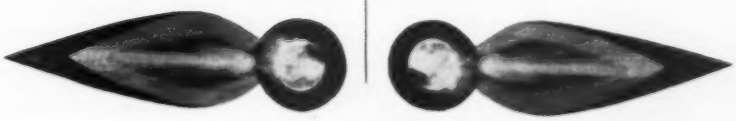
Schlumberger Overseas

perforated an oil well

at 4500 feet

with **1600**

shaped charges



Schlumberger
perforating service
saves you rig time

Mene Grande Makes Major Discovery in Venezuela

CONTINUING its uninterrupted upward curve, Venezuelan production in May was close to 1,700,000 barrels a day, according to statistics not yet complete. In March, according to final figures, it was 30,000 B/D greater than in February—1,678,220 as compared with 1,636,000. March figures by operators are given in the accompanying table.

Venezuela Production in March

(Barrels Daily)

Company	Eastern Venezuela	Western Venezuela	Total
Creole	143,830	567,370	711,200
Shell Co's	—	509,167	509,167
Mene Grande	237,084	62,958	300,042
Socony-Vacuum	46,273	—	46,273
Texas-Mercedes	32,409	13,799	46,208
Atlantic Refining	20,716	—	20,716
Richmond	—	15,367	15,367
Sinclair	11,872	—	11,872
Pantepec	10,294	—	10,294
Phillips	6,145	—	6,145
BCO, Ltd.	—	936	936
Totals	508,623	1,169,597	1,678,220

In Eastern Venezuela the most spectacular recent event was the blowout of Pantepec's El Roble RPN-27, which went wild while drilling at about 10,000 feet on April 28, in spite of a battery of three blowout preventers, and was still blowing oil and gas, though at reduced volumes, at the end of May. Precautions taken by the company in conjunction with the Venezuelan National Guard had prevented fire up to that time. Paul Adair of the Kinley firm has been on the ground directing operations since the first few days.

Elsewhere in Eastern Venezuela Mene Grande made a major strike with the new-field wildcat East Soto-1, owned jointly with Creole, which was completed for about 1,100 B/D from two zones in mid-May. They also completed Chaparro-1 near the Guarico border. Information on this well was restricted, but it was closed in on completion and the rig moved to Apamate-1, another new-field test between the Chaparro find and the El Toco field. Meneg's Divi-1, a rank wildcat in northern Anzoategui, was drilling below 4,000 feet in crooked-hole country.

Also in the state of Anzoategui, Phillips were drilling below 6,600 feet on Laloma-3, in the vicinity of their San Roque field. Socony was drilling at 9,300 feet on Guario-30A in the Greater Anaco area and at 7,400 feet on Chimire-63R. Esquina-1, a test of the southwest Chimire field, was waiting for a rig. Texas Company's Mata-2, north of Mene Grande's Chive wells, was near scheduled final depth of 12,000 feet as June began.

Farther east Creole was milling on an electrode at 5,280 feet in Guanoco-1 five miles from the asphalt lake of the same name. Location for Guanoco-2, ten miles east, was announced as the second of three or more wells to be drilled for the evaluation of this large block of acreage. Creole's Q-533, an 11,000-foot deeper-pool test in the Quiriquire field, was drilling at about 3,500 feet, and Pedernales PCA-17 on the Gulf of Paria was completed dually for about 1,600 B/D. Creole also announced location for a wildcat to be drilled jointly with Mene Grande in northeast Anzoategui, 20 miles southwest of the Mulata field, to be called East Maron-2.

In Guarico (Central Venezuela) Atlantic halted operations for the duration of the wet season in the Monal field after making a small producer of their second well there. Almost at the same time they announced that TUX-9 has discovered a new field, to be called Cocomon, about 10 miles southeast of the Tucupido field. The second Cocomon well, Copa-2, was drilling below 5,500 feet as June began. SaGX-1, a slim hole drilled south of the Saban field proper, was reportedly completing as a producer at that time. Atlantic were also drilling new-pool test Ruiz 3-X-2, south of the Ruiz field. Their new-field test, Anibal-2, rank wildcat in southeast Guarico, continued testing at 5,357 feet. Texas Company's Valle-17-1, offsetting Atlantic's Ruiz field and less than a mile from a producer, was abandoned at the end of May, and Valle-17-2 was spudded. Farther west in Guarico Mercedes-222 was suspended at 6,145 feet with the idea that it might later be completed as a gasser. Palacio-66, another new-pool test of Texas-Mercedes acreage, was preparing to run a production string. Sinclair's Piedra Azul-1, eight miles north from Tucupido, was preparing to core at 6,900 feet as June began.

In Western Venezuela Shell spudded a 5,000-foot wildcat Pauji PJ-1 in the Betijoque district of Trujillo, 15 miles southwest of the Mene Grande field. Four 2,000-footers were drilled here in the 'twenties, one of which produced oil in small quantities. Quiroz QZ-1 was spudded by the same company, with Creole and Mene Grande guaranteeing dry-hole money, at a location 22 miles south of the El Mene de Mauroa field. Like Pauji, Quiroz was fruitlessly explored by the drill many years ago. Scheduled to go to 6,000 feet, QZ-1, was reported to have had favorable shows and a DST at depths shallower than 3,000 feet. Another new test was Creole's MA-9 a mile from production in Mara and seeking a new pool. British Controlled's EM-285, originally intended as a Cretaceous test on the west side of Lake Maracaibo, failed to pull all the six-⅝ inch casing, and plugging operations preparatory to further testing were in progress. Creole's Las Polonias-1 at the base of the Paraguana Peninsula was drilling below 2,000 feet, and Texas Company's El Cocal-1 on the Gulf of Paria was nearing 10,000 feet. Shell's CQ-1 near Valera in the Andes was working stuck drillpipe near 11,000 feet. Their Pueblo Viejo deep test LS-1387 five miles offshore in Lake Maracaibo continued making hole at about 3,500 feet, while their Canadones DMC-2 was down to 4,500 feet. C-149 and C-150, deep Cretaceous tests in and near the Concepcion field respectively, were both drilling ahead at almost 8,000 feet.

Venezuelan oilmen were interested in the news that Richmond plan to drill two wildcats on the wild Goajira Peninsula, where Venezuela and Colombia have a common frontier. Perico-1 is 25 miles southwest of the Colombian town of Rio Hacha, while Oroco-1 is 38 miles northwest from the Venezuelan town of Sinamaica.

The number of rigs operating on new-hole drilling in Venezuela increased by three in April for a total of 90 as of May 1. Of these 29 were drilling for the Shell companies, 23 for Mene Grande, 12 for Creole and eight for Texas-Mercedes, while the remaining 18 were distributed among the other seven companies. Twenty-one rigs, or more than a fifth of the total, were on exploratory work, drilling wildcats, long stepouts and deep tests.

The tempo of geological and geophysical exploration remained at about the same level in March as in February, with 37 parties in the field during March. Seventeen of these were surface-geology parties, 14 seismograph, three structure drill, two gravity and one telluric. Shell companies operated 10 parties, Creole eight and Socony five, with six other companies operating from one to three each. As usual the areas of most intensive activity were the states of Zulia (Western Venezuela), Guarico (Central Venezuela), and Anzoategui (Eastern Venezuela), in that order.

At the end of March Marine Geophysical Co. of Dallas was continuing to operate a seismic survey over water in the Gulf of Paria for the joint account of seven companies—Creole, Meneg, Atlantic, Phillips, Richmond, Shell and Socony.

Venezuela's first National Petroleum Convention will be held in Caracas Sept. 9-18, according to an announcement by Dr. Gustavo Thery Fombona, director, technical office of hydrocarbons, Ministry of Mines and Hydrocarbons. Although national in character because of the nature of the papers to be presented and the sponsorship of the Venezuelan government, it will be international in attendance and interest.

General view of Shell's new absorption plant at La Paz field, Western Venezuela. The plant, which cost $7 million, has a gas-treating capacity of 900,000 cubic meters per day. Initial recovery consisted of 660 barrels per day of natural gasoline, 566 barrels of butanes. A similar plant is planned for Shell's limestone wells in the Mara district.

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International news and notes

Crossley Manager Retires

J. J. Carter has retired after holding the position of managing director of Crossley Brothers Ltd., Manchester, for 35 years. He joined the firm as a boy 60 years ago and has become one of the most respected and best loved figures in the oil engine industry. At the request of his co-directors he is continuing as a director and also as chairman of Crossley-Premier Engines Ltd.

Plan Production Increase in Poland

The Cominform has adopted a crude production goal of 375,000 metric tons for the year 1955 (about 7,500 barrels daily). This compares with an actual production in 1950 of 150,000 tons. A natural gas production goal for the new 5-year plan is fixed at 480,000 cubic meters (about 17 million cubic feet) daily. The daily *Zycie Gospodarce* recently reported that the new production plan will allow a per capita consumption of oil in 1955 of 125.4 pounds compared with 5.28 pounds in 1949. Rationing largely limits consumption to industry and agriculture.

To Build New Avgas Plant

Petroleos Mexicanos is planning to build a new high-octane gasoline plant in an effort to solve that country's current shortage, it was revealed to WORLD PETROLEUM by Senator Antonio J. Bermudez, Pemex director-general. At present, Mexico has only one high-octane refinery, of limited capacity, located at Atzcapotzalco, in Mexico's Federal District.

The shortage of both 91 and 100-octane gas is affecting airlines operating in Mexico to the point where one line—Lamsa, Mexican operation of the United Airlines—is considering cancelling a proposed new route from Monterrey to Torreon. The chief reason for the shortage, according to the airlines, is the increased consumption by major lines such as Aeronaves de Mexico, Compania Mexicana de Aviacion (Pan American Airways) and a switch from 91 to 100-octane gasoline, as newer planes are put in service.

Kuwait Students in the United Kingdom

Students from the Arab State of Kuwait now studying at various educational institutions in the United Kingdom, were the guests of the Kuwait Oil Co. (jointly owned by Gulf and Anglo-Iranian) at a gathering recently held in London to celebrate the first anniversary of the accession of the Ruler of Kuwait, His Highness Shaikh Abdullah as-Salim as-Sabah. Arrangements for their entertainment included a visit to the Houses of Parliament, a football match and a luncheon party as the guests of the Kuwait Oil Company's managing director, Mr. Southwell. The number of Kuwaiti students now in the United Kingdom is fourteen. Education, engineering and medicine are among the subjects which they are studying.

Buys Gulf Holdings

Senator Antonio J. Bermudez, director-general of Petroleos Mexicanos, made the first down payment on Pemex' purchase of the Mexican holdings of the Gulf Oil Corp. by turning over a Banco de Mexico check of $1 million to Carlos Lamar, Gulf representative in Mexico, at a brief ceremony attended by the Mexico City press. The check is the first of a series of 20 monthly payments to be paid Gulf by December of 1952.

The total sales price of $2,350,000 covers all Gulf properties in Mexico, including those of Gulf subsidiaries American International Fuel and Petroleum Co. and Hamilton, Devine S. en C.; Gulf's 1,500 barrel-a-day production, 1,000,000 barrels of crude stored in 57 tanks in Tampico, ten land concessions in the Cacalilao, Panuco and Altamira fields; two pipe lines, several pick up lines, a wharf at Tampico, almost all the company's buildings and around 100,000 acres in the States of Tampico and Veracruz.

Gulf's Mexican manager F. F. Devine will return to the United States for reassignment. Gulf's local staff of over 400 employes have been given four months' salary, plus 25 days for every year of service with the company, as severance pay, or an average of from $500 to $4,000 apiece. The government oil agency is prepared to absorb "most" of the former Gulf employees.

Gulf, only U. S. major whose Mexican properties escaped expropriation in 1938, was virtually forced to sell out to Pemex when it was refused Mexican export permits for its production. Its departure leaves only two foreign companies with oil lands in Mexico, British-owned Kermex Oil Fields Co. and the U. S.-owned Charro Oil Co.

Claims Tax Arrears

The new president of the Institute of Pensions and Retiring Funds of Transport Workers is endeavoring to collect from the oil companies a tax of nine centavos per litre on fuel sold in Brazil. This tax, introduced in 1947, has never been collected and the arrears now amount to U. S. $66 million. The companies consider that the tax should have been deducted from the proceeds of the "sole tax" on imported petroleum products, which they have been paying since 1945.

Unionmelt Brochure

The Quasi-Arc Co., Ltd., Bilston, Staffordshire, has published a 12-page brochure dealing with the Unionmelt process. The company is sole licensee in the United Kingdom for the process. Various welding heads are described in detail and data is given regarding the work range which each is designed to accomplish. Copies of the brochure, T. C. 832 are available on request.

Yugoslavian Production

The Yugoslav Government has announced that the country produced 80 percent of its oil requirements in 1950. Output has been estimated at 7,600 barrels per day for that year. The current 5-year plan envisages a production in 1952 of 9,000 barrels daily.

Kuwaiti student guests of Mr. Southwell

I. Lubbock

Jet Pioneer Retires

I. Lubbock, head of the internal combustion turbine section of the sales technical advisory department, The Shell Petroleum Co. Ltd., retired on March 31, 1951 after nearly 28 years service.

Mr. Lubbock's outstanding work on aircraft gas turbines represents only one of the many fields in which he has initiated fuel research. For instance, his great experience was put at the disposal of the Scientific Committee set up by the government to investigate the German V-weapon threat. He was in a position to assure the War Cabinet that the rumored potentialities of the V-2 were eminently feasible, for a team of Shell technicians under his leadership had already evolved an experimental rocket, using liquid oxygen and gasoline (later alcohol) as a propellant. Mr. Lubbock's testimony had a profound effect on the counter-measures adopted.

Again, just before the end of the war, Mr. Lubbock began to build up a technical organization for the close study of the industrial and marine gas turbine. As a result, the gas turbine soon to be fitted to the Shell tanker "Auris" (first merchant ship to be so powered) incorporates combustion chambers to his design.

Bulk Asphalt Delivered Overseas

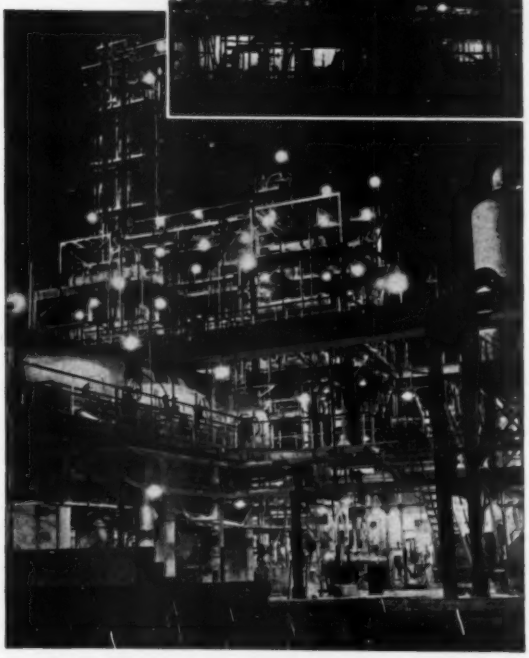
Shell Petroleum, Co., Ltd., now is delivering bulk asphalt to European ports by tanker from the West Indies. To accomplish this Shell has converted three 9,000 dwt tankers at a cost of £30,000 each. In each of the vessels a center tank of 4,000-ton capacity has been installed. Tanks are equipped with coils and fitted with jacketed lines and pumps. Wing tanks will be used for fuel oil deliveries. Converted vessels are the Liparus, Lembulus and Labiosa.

First cargo was delivered to Denmark in March. A second was unloaded in Portugal early in June. A depot is being built for bulk deliveries at Dublin. Storage at each point will be available for 6,000 tons and equipment provided for manufacturing a wider range of products from the two basic grades being delivered in bulk. Cost of each depot is about £210,000.

Brazilian Prices Higher

In view of the recent increase in ocean freights, the National Petroleum Council has fixed new rates for petroleum products in Brazil as from April 30. The average increase in the cost of gasoline is two centavos per litre, equivalent to 0.416 U. S. cents per gallon. In the Federal District the charge, per ten gallons, is now U. S. $5.29 for gasoline and U. S. $4.41 for kerosine. Diesel oil and fuel oil will henceforth cost U. S. $50.16 and U. S. $28.10 per ton at the official rate of exchange.

Non-Stop Operations



Illuminating the desert for miles around are the bright lights of Anglo-Iranian's major Middle East refinery at Abadan, largest in the world. Anglo-Iranian has refineries in eight other countries, including three in the United Kingdom, four on the continent of Europe and one in Australia. A large new refinery in England is also under construction.

Operating night and day, the processing by Anglo-Iranian of crude oil into quality products for the world's markets goes on unceasingly. Here is the night shift's view of an Alkylation Plant and (inset above) a Distillation Unit.

First and Biggest

oil producers in the Middle East since 1912, Anglo-Iranian Oil Company and its associated companies also operate twelve refineries in Europe, Middle East and Australia; their sales organisation includes major marketing or supply interests in Europe, Asia, Africa and Australasia, with international ships' bunkering and aviation services.

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LPGas in Middle East

Liquefied petroleum gases are being distributed in sharply increasing volume in the Middle East according to A. J. Gilbreath, manager of air conditioning sales of Servel Inc., and Bill Scheunig, Middle Eastern sales manager, who recently returned from a survey trip through the area.

In Egypt there are now 40,000 bottled gas customers equipped with various appliances such as refrigerators, water heaters and cook stoves. The gas is supplied from Shell's Suez refinery at prices low enough to compete with manufactured gas.

In Saudi Arabia the air conditioning and refrigeration installed in homes and offices of Arabian-American Oil Co. personnel have caught the interest of Arabs. As a result Servel has appointed a distributor for that area. Forty air conditioning units have been shipped to the new distributor. These are of the type used for both space heating and cooling using LPGas or kerosine for fuel. Distributor is Suliman Salek Oloyan at Al Khabar. Aramco is arranging to supply the bottled gas and kerosine from the Ras Tanura refinery.

Mr. Gilbreath and Mr. Scheunig point out that gas and kerosine fired appliances are finding favor in Europe as well as the Middle East because of the unreliability of electrical service. In some areas electricity is not distributed on a 24-hour basis. There is also no standardization of voltage or cycles so that it is difficult to install and satisfactorily operate motor driven refrigerators. Servel has enjoyed an increase of 130 percent in export shipments of appliances thus far in 1951.

Hungarian Production

It is officially announced that Hungarian oil fields produced 500,000 metric tons, about 10,500 barrels of crude oil per day in 1950. All production is in the hands of the MAAVOL (Soviet-Hungarian Oil Co.). Petroleum products are rationed in Hungary currently while about 40 percent of the current supply is exported to the U.S.S.R.

Map showing areas in Northwest Bolivia opened to oil exploration by mixed companies.

Bolivia to Invite Exploration

Six areas in Bolivia have been opened to oil exploration under the law adopted by the National Congress on November 6, 1950. Under the new law Yacimientos Petroliferos Fiscales Bolivianos is authorized to execute contracts for development with mixed companies which may desire to explore the areas. Concessions must be approved by the Congress. Areas opened to exploration are shown in the accompanying map and include Pando, Beni, Iturraldo, Capolican, Ayopaya and Chapare.

The Bolivian government hopes by the new move to interest foreign capital which has been barred from oil development since 1937, when Standard Oil Co. (N. J.) properties were taken over by Y.P.F.B. Current national production is now about half enough to supply local refineries.

New Oil Search in Sarawak Jungle

Two wildcats are being drilled by Shell in the densely-forested interior of Sarawak, British Borneo. One well is being drilled at Subis, about 12 miles inland, and the location is accessible to river craft, and the other at Bulak Setap, and this has necessitated the construction of a 30-mile road at a cost of nearly £200,000. The sites have been chosen on the basis of extensive geological and geophysical surveys.

Sarawak, adjoins the State of Brunei, where Shell's Seria field has been increasing its production at a remarkable rate during recent years; its present production rate of 5,000,000 tons per year is six times the 1939 rate. The new projects are a further attempt on Shell's part to increase the production of sterling oil.

New Five-Year Plans Announced

The period covered by the most recent (1946-50) five year plan having elapsed the Soviet government and those of allied countries have been announcing results achieved and have been setting up new goals for the period ending in 1955. New quotas have been set for the oil industry in Poland, Romania, Hungary and Austria. The new quota for Russia itself has not yet been made public.

While satellite countries have not been as successful as had been hoped by the planners, Russian fields appear to have exceeded the plan by a substantial margin. The plan was to produce 35.4 million metric tons (about 700,000 barrels daily) in 1950 whereas actual production was indicated to be about 750,000 barrels daily.

For the new five-year period the goal for Romania appears to be particularly ambitious in view of the disappointing results achieved in recent drilling operations. By 1955 the plan is to produce 200,000 barrels of crude per day. This compares with the recent level of about 86,000 barrels daily and the pre-war peak of 175,000 barrels daily in 1936.

Official announcements are that 1950 production of crude totaled 5,430,000 metric tons (about 104,000 barrels daily). These figures are thought by many to be quite optimistic. Some estimates have been as low as 80,000 barrels daily for the year.

Romanian drilling in 1950 was reported at two million feet against a goal of 2,130,000 feet but most of this drilling was in proven territory. The 1950 figure compares with a reported footage of 1,600,000 feet in 1949.

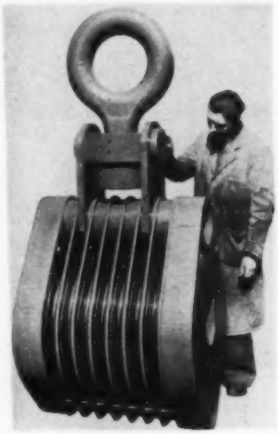
For the new five-year plan the Romanians plan a rise in drilling each year to reach a total of 4,100,000 feet in 1955. Nearly half of this is to be of an exploratory nature in the hope of finding new fields.

To handle and process the anticipated increase in crude output it is planned to lay new pipe lines and to enlarge and modernize refineries. Cracking capacity is to be doubled. In order to accomplish this a budget of 129 billion Lei ($875 million) has been adopted.

Natural gas production and pipe line facilities also are to be doubled with an additional investment of $83 million. Recent production has been at the rate of about 185 million cubic feet daily. Much of the gas production is being used for the manufacture of electricity. Consumption is preponderantly industrial.

British Tanker Building Active

Large contracts for new tankers to be built in Great Britain have been recorded during the month of May, by Shell Petroleum Co. Ltd. and Esso Petroleum Co. Ltd. The former company announced a £45,000,000 tanker building program which comprises 46 vessels of a total dead weight tonnage of nearly 900,000 of which 36 totaling nearly 600,000 dwt. are to be built in British yards, and the remainder in Holland. In addition, two tankers of general purpose type of 18,000 dwt. are being built in British yards for their associated company, Eagle Oil and Shipping Co. Ltd. These British built tankers comprise four of the new super tankers ("V" Class) of 28,000 dwt. and a total of 29 of the new general purpose type of 18,000 dwt. Of these new tankers to be built in Britain 27 are steam turbine vessels, while the other two will be turbo-electric, each having two turbo-alternators to supply ac current for one propulsion motor. This arrangement permits one of the turbo-alternators to be lifted out for repair and replacement by a spare unit, thus affecting a saving in ship's time. The Esso Petroleum Co. Ltd. announces a £7,500,000 tanker order for six new oil tankers, each of 26,500 dwt. Four of these vessels will be used for transport of Middle East crude to the new Fawley Refinery, and the other two will be for the Standard Vacuum Oil Co. for their trade in sterling area. The propelling machinery for these tankers will consist of a reduction gear turbine of 12,000 shp, driving a single screw.



An out-size pulley block recently manufactured by Ansell, Jones & Co. Ltd., for use in building a new oil refinery. The block is over seven feet in height and was tested to 150 tons. It is being used in lifting heavy equipment during the refinery construction.

Atlas Supply in Germany

The Atlas Supply Co. of Germany has been founded and registered with an office at Hamburg. The directorate consists of F. H. Bedford, Jr., J. E. Partenheimer, R. B. Holgate, R. P. Morgan and J. H. Buchanan. Atlas is affiliated with the Standard Oil Co. (N. J.)

Orders LPGas Tanker

Deutsche Vacuum Oel AG has placed an order with Howaldtwerke, Kiel shipbuilding firm, for the conversion of the Liberty ship Edvard Grieg into an LPGas tanker. Conversion will involve the installation of compressors and 66 vertical pressure tanks of 250 psi working pressure. Each tank will be about 12 feet in diameter and have a liquid capacity of about 700 barrels. Total LPGas capacity of the ship will be about 46,000 barrels.

When completed in about 14 months the vessel will be placed in inter-American trade to supply Latin American markets. Registry will be either Panama or Liberia.

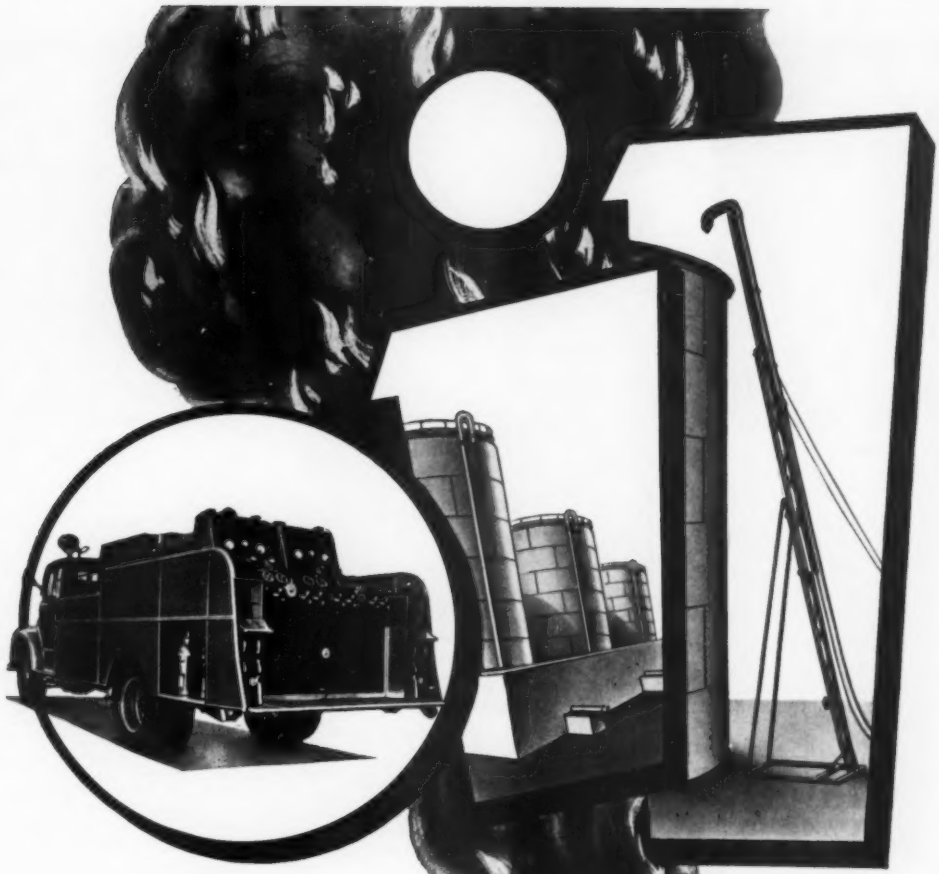
Kuwait Crude Production at All Time High

Crude oil production of April reached 2,038,205 tons (503,000 B/) in the Shaikhdom of Kuwait, which compares with 1,572,564 tons (365,000 B/D) in March and 1,238,663 tons for April, 1950, according to figures released by Gulf Oil Corp. on behalf of Kuwait Oil Co., Ltd., of London, England.

Production for the first four months of this year totaled 6,736,104 tons as compared with 4,710,954 tons for the similar 1950 period.

Schlumberger Suffers Fire Loss

A disastrous fire of unknown origin broke out in the warehouse of Schlumberger at Oficina del Tigre, Venezuela, on the night of May 29. Destruction was estimated by Louis Allaud, Schlumberger superintendent for Eastern Venezuela, at nearly a million dollars.



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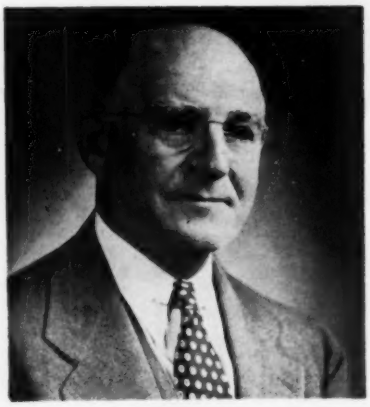
Oil company staff changes



H. A. Gidney

H. A. GIDNEY has retired as director and executive vice president of Gulf Oil Corp. after more than 31 years. He was a member of the executive committee, finance committee and numerous other important management and employee benefit committees. Mr. Gidney joined Gulf in Jan. 1920, becoming chief accounting officer in the same year. He was elected a vice president in 1935, a director in 1941, and he was elected executive vice president in 1948.

BROWN L. MEECE has been elected a vice president of Sinclair Refining Co. and will take charge of the western marketing division. Marc F. Braeckel is vice president in charge of eastern marketing. Both will report through C. F. McGoughran, vice president and general sales manager, to Ernest L. Hughes, vice president in charge of marketing operations.

Mr. Meece is a veteran of 30 years in the marketing branch of the industry. He has been vice president and sales manager of Globe Refining Co. since 1932. Previously he had been associated with Tidewater, Champlin, Quaker Petroleum and Producers and Refiners Corp.

R. G. FOLLIS has been elected chairman of Trans-Arabian Pipe Line Co. W. F. Moore, president of Arabian American Oil Co., was elected to the Tapline board and named as a member of the company's executive committee. W. S. S. Rodgers was elected chairman of Aramco to succeed H. D. Collier who has been chairman since 1940. Mr. Collier continues as a director.

PAUL W. McFARLAND has been advanced to assistant chief geologist for Sun Oil Company's southwest producing division, with headquarters in Dallas. He will continue as regional geologist in charge of the San Antonio, Corpus Christi and McAllen districts, a position he has held for a number of years.

FRED C. HANKER, JR., has been named assistant to the president in the Catalytic Construction Co., Philadelphia, Prior to joining Catalytic, Mr. Hanker was a process engineer with Standard Oil Development Co. From 1944 to 1948 he was with the Carter Oil Co. as assistant to the vice-president of manufacturing department, and actively participated in the development of Carter's Billings Montana refinery.

JOHN M. GRIFFITH has been appointed as engineer of research of the Asphalt Institute. He succeeds Prevost Hubbard, retired. For the past eight years Mr. Griffith has been with the Flexible Pavement Branch of the Waterways Experiment Station at Vicksburg. This is a research branch of the U. S. Corps of Engineers.

SAM M. GLADNEY has been appointed manager of Sun Oil Co.'s southwest producing division to succeed J. H. Pressley who has been ill for some time. Mr. Gladney has been assistant manager of the division since 1947. Mr. Pressley has been with Sun since 1905. Succeeding Mr. Gladney as assistant manager will be Tom F. Hill, who has been regional land superintendent.

Mr. Gladney joined Sun in 1919 as a clerk in the accounting department at Dallas. Mr. Hill joined Sun 20 years ago as a sample washer in the paleontology laboratory at Dallas, working part time while still a student at Southern Methodist University.

Glenn W. Poorman H. J. Nichols, Jr.

Reorganizes Supply and Transport Operations

Three departments have been organized to replace the present supply and transportation department of Esso Standard Oil Co. to effect closer managerial control and coordination. A new supply department with four divisions has been established under H. Janney Nichols, Jr., a director and former general manager of the supply and transportation department, as general manager. Glenn W. Poorman, formerly manager of general office sales, will be assistant general manager. Mr. Poorman will also act as chairman of the supply committee composed of members of the company organization.

The inland waterways division and traffic division also have been made separate departments and will continue under the present heads, R. G. Kimball, general manager, and E. D. Sheffe, general traffic manager, respectively. The four divisions of the supply department are tonnage and tankage, product exchanges and purchases, supply and distribution.

E. D. Sheffe R. G. Kimball

Millard K. Neptune

MILLARD K. NEPTUNE has been elected president of the Platte Pipe Line Co. He succeeds H. L. Phillips, vice president of the Sinclair Oil Corp. and president of the Sinclair Oil & Gas Co., who has been acting as interim president.

Mr. Neptune was assistant director of production, Petroleum Administration for Defense, prior to joining Platte. Prior to last February he was manager of the foreign department of Continental Oil Co. and previously was with Phillips Petroleum Co.

The Platte Pipe Line Co. was organized by Continental Oil Co., the British-American Oil Co., Ltd., the Ohio Oil Co., the Pure Oil Co. and Sinclair Oil Corp. to build a 20-inch crude line from Wyoming to St. Louis.

R. C. BARBOUR has been appointed manager of Humble Oil & Refining Company's production department. He will be active head of all production operations, reporting to the director in charge, C. E. Reistle, Jr. At the same time there were created two training positions to be occupied by assistant managers. These posts will be filled for the present on a rotating basis on tours of one year each.

Bowman Thomas, former chief petroleum engineer, will be assistant manager in charge of all staff organizations of the department. R. R. McCarty, who has been assistant division superintendent in Southwest Texas, will head drilling and producing operations. As part of the training program, Douglas Ragland will become chief petroleum engineer. He was formerly assistant chief petroleum engineer.

Mr. Barbour joined Humble in 1921 as a lease oil pumper. He became general superintendent of the production department in 1946.

Bowman Thomas joined Humble as a junior petroleum engineer in 1929. In January 1940 he was promoted to assistant chief petroleum engineer. He was named chief petroleum engineer in the production department in 1945.

R. R. McCarty began his career with Humble as a student engineer in 1930. After serving in a number of fields, he was appointed assistant division superintendent of the Southwest Texas division in 1946.

BURL S. WATSON has been elected the executive vice president of the Cities Service Co. At the same time Emil Schram, former president of the New York Stock Exchange was elected a director. Mr. Watson has been associated with Cities Service since 1917. For many years he was assistant to president W. Alton Jones, becoming a vice president in 1940 and occupying officerships in various Cities Service subsidiary companies.

"The greatest challenge to increased productivity may lie in the greater use of ourselves as people. It has long been the belief of the company with which I am associated that people are its greatest single asset. What is true of a company is also true of a nation. The machines of an industrial nation can be bought or otherwise acquired, but it is the skill and willingness of the people to use such equipment which will, in the end, be the deciding factor"

From a speech by Eugene Holman, President, Standard Oil Company (New Jersey), June 3, 1946

STANDARD OIL COMPANY (NEW JERSEY)

AND AFFILIATED COMPANIES

KEITH L. PFUNDSTEIN has been appointed manager of agricultural engineering for the technical service division of Ethyl Research Laboratories. He succeeds Dan M. Guy who was recently appointed assistant director of the technical service division. Mr. Pfundstein joined Ethyl Corp. in 1940 as a student engineer. After service as a field engineer he was transferred to the company's principal research laboratories at Detroit.

A. H. RINEY has resigned as vice president of Phillips Petroleum Co. in charge of the engineering department. He will retire from active duty but will be available to the company for consultation by the manager of the engineering department or on specific assignment by the chairman or president. Mr. Riney has been head of the Phillips engineering department for 30 years. During his service the company has grown from a small company to one of the largest integrated units in the industry.

Two New Key Company Officers

L. W. Matthey has been elected vice president and assistant general manager; and F. B. Riggan vice president in charge of research and development of Key Co., East St. Louis, Ill. Mr. Matthey formerly was assistant to the president and Mr. Riggan was manager of manufacturing and chief metallurgist. Key Co. produces oil refinery equipment including special steel castings.

Theodore R. Colville

Heads B-J Advertising

Theodore R. Colville has been assigned the management of all advertising and sales promotional activities for the four divisions of Byron Jackson Co. He has been advertising manager for the pump division. Previously he was with General Electric Co. in Schenectady, N. Y., in the advertising activities of the chemical department.

GEORGE R. BENZ has been appointed manager of the engineering department of Phillips Petroleum Co. to succeed E. F. Kinsvater who has been transferred to Washington. Mr. Benz has been manager of the chemical engineering division of the research and development department and will be succeeded in that position by C. K. Buell, his former assistant.

Mr. Benz has been with Phillips for 26 years. Much of his work has been in connection with the development of liquefied gases and pure hydrocarbons for research and development work. More recently he has been engaged in work involving other petrochemicals such as agricultural and rubber products.

HERBERT E. RANDLETT, JR., has been named technical representative in the New York office of Shell Development Co. He replaces Harry K. Sutherland who becomes assistant director of Shell's agricultural laboratory at Modesto, Calif. Mr. Randlett was administrative assistant to the director of research at Shell Development's Emeryville laboratories.

Roger F. Dunn

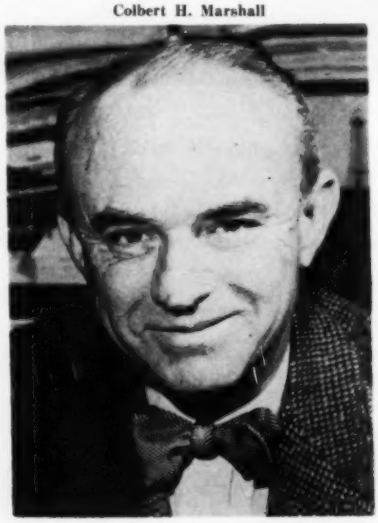
ROGER F. DUNN has been elected secretary and treasurer of Graver Tank & Mfg. Co., Inc., to succeed B. B. McCandliss who has been named senior vice president, it was announced by E. N. Gosselin, president, following a recent directors' meeting. Mr. McCandliss has been a director since 1945 and a vice president since 1948.

V. W. ROOKE has been appointed assistant to C. F. McGoughran, vice president and general sales manager of Sinclair Refining Co. Mr. Rooke joined Sinclair in 1924. In 1949, he was appointed regional manager of the eastern district. He is succeeded in that position by L. W. Leath.

CARL J. MAKI has been appointed manager of the gas and gasoline department of Seaboard Oil Co. of Delaware, Dallas. Mr. Maki was formerly in the gasoline department of Phillips Petroleum Co. He spent five years in Venezuela as superintendent of gas department for Mene Grande Oil Co. and recently served as assistant chief of the gas branch in the production department of the Gulf Oil Corp., Pittsburgh. R. E. Heithecker formerly in this department will be in charge of the newly created reservoir engineering department in the Dallas office of Seaboard.

COLBERT H. MARSHALL has been elected vice-president of Ashland Oil & Refining Co. in charge of crude oil production and related operations. He joined Allied Oil Co. and its subsidiary, Central Pipeline Co., in 1942. Since their merger with Ashland in 1948, he has been general manager of Ashland's crude oil procurement, production and pipeline operations in the Southwest. He will continue to maintain his headquarters at Oklahoma City.

Colbert H. Marshall



FRANK O. PRIOR, vice president in charge of production, a member of the executive committee and a director of Standard Oil Co. (Indiana), has been elected executive vice president by the board of directors. Mr. Prior joined Midwest Refining Co., a former Standard subsidiary, in 1919 as a roustabout in Wyoming. He was made president of Stanolind Oil and Gas Co. in 1930, when that company was formed through the merger of several producing subsidiaries. In 1945 he was elected a director and vice president of Standard.

Jack Clarke Moves to Texas Eastern

Jack Clarke has been appointed director of public relations for Texas Eastern Transmission Corp. with headquarters at Shreveport, La. He will supervise all public relation activities of the corporation, including financial and stockholder relations, publications and advertising.

Mr. Clarke was formerly assistant to the chairman of Lion Oil Co. He has been closely associated with the oil and gas industry since he joined that company in 1938.

During World War II, Mr. Clarke served in all three theatres of war but principally in the Pacific. Since the war he has been active in oil industry organizations, including the National and Arkansas Oil Industry Information Committees of the American Petroleum Institute, the Texas Mid-Continent Oil and Gas Association and the Independent Petroleum Association of America.

Harry A. Dennis

Appointed Assistant Sales Manager

Harry A. Dennis' appointment as assistant sales manager for Graver Tank & Mfg. Co., Inc., was recently announced by J. E. Swanson, executive vice president. Mr. Dennis assists Willard M. Broxham, who directs Graver's sales. Mr. Dennis has been associated with Graver for more than two years as manager of sales, first for Graver's weldment division and later for the alloy division as well.

Henry L. Taylor

Henry London Taylor (62) assistant sales manager of chemical sales for Lion Oil Co. died May 23 after a brief illness. Mr. Taylor joined Lion in 1946. During World War II he was in charge of nitrogen allocations for the War Production Board in Washington, D. C.

W. T. STEVENSON has been elected president of Texas Gas Transmission Corp. J. H. Hillman, Jr., formerly president and chairman will continue as chairman. Mr. Stevenson has been executive vice president and director of Texas Gas since the company was formed in 1948.

SAMUEL T. COLEMAN has been named manager of the land department of Deep Rock Oil Corp., filling the position vacated recently by the resignation of F. E. Swenson. Mr. Swenson resigned to become president of the State Lands Exploration Co., Midland, Texas.

BOOKS

PRACTICAL OIL GEOLOGY—Dorsey Hager	$ 4.00
PRACTICE OF LUBRICATION—T. G. Thomsen	$ 8.00
PETROLEUM PRODUCTION ENGINEERING — L. C. Uren "Oil Field Development"	$ 7.50
PETROLEUM PRODUCTION ENGINEERING — L. C. Uren "Oil Field Exploitation"	$ 7.00
PETROLEUM PRODUCTION ENGINEERING — L. C. Uren "Petroleum Production Economics"	$ 7.50
PETROLEUM REFINERY ENGINEERING—N. L. Nelson	$ 9.00
PETROLEUM PRODUCTION (5 Volumes)—Park J. Jones	
Vol. I—Mechanics of Production: Oil, Condensate and Natural Gas, 1946	$ 5.00
Vol. II—The Optimum Rate of Production, 1946	$ 5.00
Vol. III—Oil Production by Water, 1947	$ 5.50
Vol. IV—Condensate Production and Cycling, 1948	$ 5.50
Vol. V—Oil Production by Gas & Flooding, 1948	$ 6.00
PRINCIPLES OF SEDIMENTATION—2nd Edition—W. H. Twenhofel	$ 6.50
PETROLEUM CHEMICALS INDUSTRY—Richard Frank Goldstein	$ 8.50
ROTARY DRILLING HANDBOOK—4th Edition—Brantly	$ 7.50
SAFETY IN PETROLEUM REFINING & RELATED INDUSTRIES—George Armistead, Jr.	$10.00
The Science of Petroleum, Vol. 5, Pt. 1, Crude Oils—Benjamin T. Brooks and A. E. Dunston	$11.00
STRUCTURAL GEOLOGY OF NORTH AMERICA—A. J. Eardley	$12.50
THEORY AND PRACTICE OF INDUSTRIAL RESEARCH —David Bendel Hertz	$ 5.50
WORLD GEOGRAPHY OF PETROLEUM—edited by Wallace E. Pratt and Dorothy Good	$ 7.50

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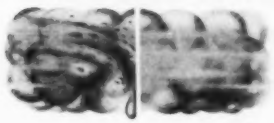

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If you are generating Saturated steam it is almost certain to be carrying moisture when it leaves the boiler and it will get wetter with every yard of travel through the mains.

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A Model of Organization

(Continued from page 22)

Dr. E. V. Murphree was elected chairman of the permanent council of the congress at the close of the recent meeting. He will serve until the next congress which probably will convene in 1955. Four vice chairmen of the permanent council elected at The Hague are: G. A. Tuyl Schuitemaker, The Netherlands; S. Scheer, France; C. A. P. Southwell, Great Britain and Carlos Perez de la Cova, Venezuela. Col. S. J. Auld, Great Britain, was elected honorary treasurer.

Dr. Murphree has been chairman of the Standard Oil Development Co. since 1947 and is one of the leading men in the sphere of research in the petroleum industry of the United States. During World War II, Dr. Murphree was a member of the Office of Scientific Research of the Development S-1 Executive Committee. This committee was responsible for working out plans for the development of the atomic bomb. He was also charged with the supervision of a heavy water installation in British Columbia. In August 1950 he was appointed a member of the advisory committee of the Atomic Energy Commission for a period of six years.

Mr. Schuitemaker is technical advisor to the Royal Dutch Shell Group, Mr. Scheer is president and general managing director of the Standard Francaise, Mr. Southwell is president of the Institute of Petroleum, while Mr. Carlos Perez de la Cova is the commercial attache of the Venezeulan Legation in London.

Site of the 1955 congress has not yet been selected. The permanent council will meet in Paris in the autumn and may reach a decision at that time. The fifth congress will meet in the United States in 1959 at the time of the one hundreth anniversary of the Drake well, the first to be drilled for petroleum. Venezuelan delegates to the congress have suggested that Spanish be the official language of the next Congress. This proposal will be studied at the time that the permanent council selects the next meeting place. A request made by Mexico to appoint a representative of that country on the permanent council was carried unanimously.

Western Geophysical Opens New Office

Western Geophysical Co. of America recently moved into its new West Texas and New Mexico district office at 2400 West Indiana St., Midland, Texas. Headquartered here are George J. Shoup and Fred J. DiGulio, supervising geophysicists; W. T. Ross, recording instrument supervisor; J. H. Frazier, shop superintendent; and D. F. King, drilling supervisor. The district is part of the division headed by Booth B. Strange, vice president in charge of all operations in the Mid Continent, Gulf Coast and Eastern States.

Book Review

Oil and Gas Production; an Introductory Guide to Production Techniques and Conservation Methods: compiled by the Engineering Committee of the Interstate Oil Compact Commission; published 1951 by University of Oklahoma Press, Norman, Okla., 128 pages, $2.75.

The Interstate Oil Compact Commission has produced this small volume for the benefit of oil producers, royalty owners, lawyers, government officials, bankers, geologists, high school and college students and all who feel the need of information about oil and gas production without having to cope with the highly technical language used by top ranking specialists in the industry. The discussion is simplified and clarified by many illustrations, charts, graphs and tables. With this guidance the non-specialist is introduced to essential knowledge of how oil is accumulated in the earth, where it is likely to be found, and the various means whereby it is produced. And, naturally, the Commission does not neglect to emphasize the wisdom of methods of production that will produce the most oil with the least waste.

O'Connor Returns from Spain

J. B. O'Connor, executive vice president of Dresser Industries, Inc., and his wife Sansa, have returned to Dallas, Texas, following a month's tour of Spain and Portugal. They report facilities for tourists and auto travel throughout Spain as excellent, and were particularly well pleased with the hotel service in this colorful country. Being one of the "travelingest" executives in the international oil and gas equipment industries, Mr. O'Connor is especially well qualified to appraise these travel advantages.

New Field in Mexico

Discovery of a new oil field in the Tehuantepec Isthmus area of Mexico has been announced by Ralph K. Davies, president of American Independent Oil Co. The discovery well, known as Rabon Grande No. 1, is located about five miles east of the city of Coatzacoalcos, Tabasco, and present indications are that it will flow at a rate of 200 to 250 barrels daily of 32.5 gravity oil.

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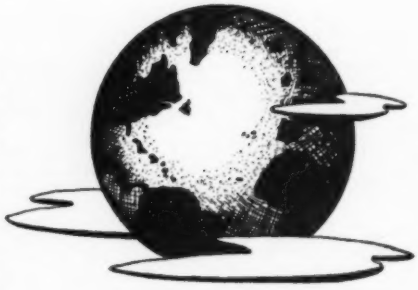

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Book Review

Structural Geology of North America, by A. J. Eardley; published 1951 by Harper & Bros., New York; 624 large pages; $12.50.

This monumental book is described as the first book in any language which deals in some detail with the structural evolution of an area as large as a continent. Using 16 pages for paleotectonic maps in full color and 750 other illustrations, the author gives a conspectus of the changes in the structural and the geographic mutations that this continent has undergone from the beginning of post-Proterozoic time to the present. For this purpose the author recognizes 31 major regions and describes their characteristics. The book is designed for advanced students of geology, and as a reference book for professional geologists who need to dovetail their particular projects with the fundamental structures in their regions. Copies available through the Book Dept. WORLD PETROLEUM, 2 West 45th St., New York 19.

Fuel Oil Publicity Campaign

Trustees of the Fuel Oil Foundation will conduct a publicity campaign during the coming year according to Harry B. Hilts, executive trustee. In addition to the publicity program, the foundation will continue to provide advertising which can be run by local industry groups and associations. Dealers will be given promotional literature and an ample selection of advertisements which they can run in their local newspapers.

Northwestern to Expand

Northwestern Refining Co., St. Paul Park, Minn., is building a new 30,000-barrel refinery adjacent to its present 8,000-barrel plant. The new installation will include crude distillation, catalytic cracking and polymerization units together with usual treating and stabilizing facilities. PAD has issued certificates for $2 million to cover initial phases of the work. Completion of the project will require two years.

Crude supplies for the enlarged plant may be obtained at the Superior, Wis., terminal of Inter-Provincial Pipe Line Co. The newly discovered producing area in North Dakota also is a possible source of raw material.

Northwestern was founded by the seven Erickson brothers in 1939. Arthur T. Erickson is president and Elmer E. Erickson general manager.

Chemical Research Laboratory

Gulf Oil Corp. is erecting a new chemical research laboratory at its Harmarville, Pa., research center. The building and equipment will cost an estimated $1,100,000. Three sections devoted to product development, analysis, and organic synthesis, will occupy the new facilities. Space will be divided into 33 laboratory rooms, 25 offices, a conference room and five service and chemical storage rooms.

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W. F. Rockwell, Jr.

Visits South America

W. F. Rockwell, Jr., president of Rockwell Manufacturing Co., has returned from a trip to South America where he took a close look into the market potential for the international division of his company. The meter and valve division of Rockwell has long been a supplier of valves, meters and pressure regulating equipment for the petroleum industry, and Mr. Rockwell contacted the major oil companies in Venezuela to discuss their future plans and requirements.

New Youngstown Appointment

Arch J. Cochrane of Hammond, Ind., has been appointed assistant manager of Chicago district operations for The Youngstown Sheet and Tube Co. Mr. Cochrane, a native of Cleveland, Ohio, has been in the steel business more than 25 years, in line and executive positions. He will assist B. M. Stubblefield, district manager.

Youngstown is in the midst of an expansion program at its Harbor Works here which will cost in excess of $90 million.

New Diesel Catalog

Diesel power units are featured in a new catalog just released by International Harvester Export Co. All six International 4-cycle power units which range from 45 to 180 horsepower are described in this 24-page booklet. Diagrams as well as machine and "cutaway" views illustrate the catalog. In addition there are dimensional charts, performance curves, model specifications, and descriptions of well-known design features. Copies of the catalog, E-51-A, (in English) are available upon request from Merchandising Services, International Harvester Export Co., 180 North Michigan Avenue, Chicago 1, U.S.A.

Heads Foster-Wheeler Manufacturing

Gerald D. Dodd, assistant to the president of Foster-Wheeler Corp. has assumed charge of manufacturing at the company's Carteret, N. J., and Dansville, N. Y., plants, succeeding William Lonsdale, vice president in charge of manufacturing retired May 1. Mr. Lonsdale joined the Wheeler Condenser and Engineering Co. (predecessor of Foster-Wheeler Corp.) in 1907, as a construction engineer. In 1921 he was appointed works manager and in 1936 he became vice president in charge of manufacturing. He will continue to serve as a special consultant. Mr. Dodd joined Foster-Wheeler in 1929 as manager of the heater and evaporator group. In August, 1950, he became assistant to the president.

Moves Offices

The National Supply Export Corp. has moved to the 20th and 21st floor of the Sinclair Building, 600 Fifth Avenue, New York. New York office of the Spang-Chalfant division of the National Supply Co. and the export department of the engine division of National Supply also moved

World's Largest Flasher Nears Completion

Construction of the world's largest vacuum flasher, a 55,000 barrel per day unit for the Standard Oil Co. of California, is now more than 75 percent complete, according to The M. W. Kellogg Co., refinery and chemical engineers of New York City, which is erecting it.

Scheduled to go on stream by the middle of July, the unit is designed to provide approximately 30,000 barrels of feed each day for the existing catalytic cracking unit at Richmond. The cracker is being revamped during a general modernization program at this refinery. Asphalt which comes off the flasher as a bottom product will be charged to visbreakers to produce gasoline and high quality fuel oil.

According to Kellogg, the main tower in the flasher will have an overall height of approximately 100 feet and a maximum diameter of 27 feet. Its design capacity is believed to exceed by 15 percent the largest vacuum unit currently in operation.

Cuts Antioxidant Price

A price reduction of its two principal gasoline antioxidants has been announced by the petroleum chemical division of Du Pont's organic chemicals department. The reduction amounted to approximately five and six percent respectively. The new prices were effective June 1.

Florent H. Bailly, Consul Gilberto Capriles and Murray Walker, guest speakers at the Los Angeles Nomads May meeting.

Los Angeles Nomads

Latin American developments were featured in three addresses before the May meeting of the Los Angeles chapter of Nomads. Headliner of the evening was Florent H. Bailly of Petroleum Engineering Associates, Inc., who discussed the current necessity for hemisphere solidarity based on common aims of north and south American nations. Consul Gilberto Capriles of Venezuela described the vast natural resources of his country. Murray Walker, who has just returned from a Latin American trip for Lane Wells, reported that business prospects in Brazil, Colombia and Peru are particularly bright.

Esso Orders Six Super Tankers

Six super tankers with a volume capacity of 230,000 barrels each have been ordered by the Esso Shipping Co., affiliate of Standard Oil Co. (N.J.). The new ships will bring to 18 the number of such vessels contracted for in the United States in a little more than three years. The six tankers will be built by the Newport News Shipbuilding and Dry Dock Co., Newport News, Va., and are expected to be completed by the beginning of 1953. The first of the vessels is scheduled for delivery in August 1952. Fleet of Jersey and its affiliates will consist of 130 oceangoing vessels and 2,350,000 deadweight tons when the new vessels are delivered. Company affiliates also own 79 special service and lake type tankers of about 240,000 deadweight tons.

The new tankers will have a service speed of about 16 knots and a deadweight of 26,800 tons. Each will be 628 feet overall length and have 82 feet six inches of moulded beam, 42 feet six inches of moulded depth to the upper deck and normal complement will be about 48.

The tankers will be of single deck type with steel welded and riveted construction. Each will have a single screw driven by a high pressure geared steam turbine capable of developing 12,500 shaft horsepower at 112 revolutions per minute.

Ideco Streamlined Swivels

IDECO, a division of Dresser Equipment Co. has published Bulletin SS-51 to describe Models DSS-300, SS-300, SS-250 and SS-150 streamlined swivels with floating washpipe assemblies. The bulletin presents construction details, specifications and one page of photos showing the "Nonpareil" washpipe packing quick change procedure. Copies are available by writing to IDECO, a Division of Dresser Equipment Co., P. O. Box 1331, Dallas 1, Texas.

Pulsometer—Joseph Evans

The Pulsometer Engineering Co. Ltd., pumping, refrigerating and filtration plant manufacturers of Reading, have acquired the total share capital of Messrs. Joseph Evans and Sons of Wolverhampton who have been pump makers since 1810. Each organization will continue to operate separately but the combination will help production to be speeded up, efficiency increased and developments kept abreast of all modern requirements.

New Polystyrene Plant

A new polystyrene plant is now in operation at Partington, near Manchester. This plant owned and operated by Styrene Products Ltd. (a company formed by Petrochemical Ltd. and Erinoid Ltd.) was engineered and constructed by Petrocarbon Ltd., and covers an area of nearly five acres. Its production capacity is 5,000-6,000 tons of polystyrene per year. The raw material used is styrene, manufactured from raw products supplied from the adjacent petroleum chemical plant of Petrochemicals Ltd.

Peak Pressure Indicator

A new maximum pressure indicator for internal combustion engines is being manufactured by Dobbie McInnes, Ltd., Glasgow, under Sulzer's Swiss patents. The instrument is used to determine diesel fuel line pressures and cylinder peak pressures. Indicators are calibrated in 100-pound increments up to 1,500 psi. Only moving part is a stainless steel bellows which is readily cleaned.

Joins Graver Tank Research Project

Dr. Edwin Wetterstrom has joined the research and development staff of Graver Tank & Mfg. Co., Inc. as analytical engineer. His duties are to pursue new and independent lines of research in problems of the storage of volatile liquids. These avenues are a continuation of his advanced work at Purdue University, where he held the Graver Research Fellowship and conducted theoretical and experimental investigations related to practical problems in new Graver projects. He has had extensive experience in the design of pressure vessels and steel structures, and had been the author of several important articles on engineering design, which have been published in professional journals. For the Pressure Vessel Research Committee of the Welding Research Council, he was project engineer in charge of analysis.

Dr. Edwin Wetterstrom

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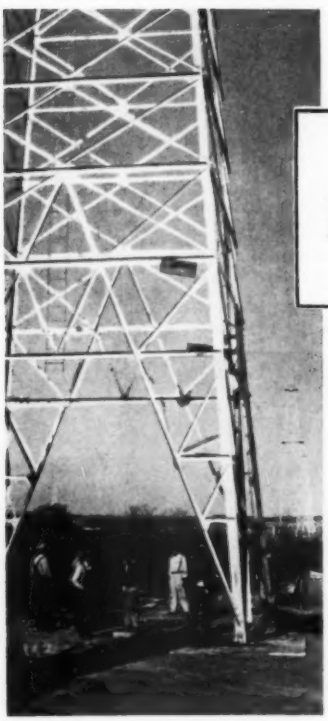

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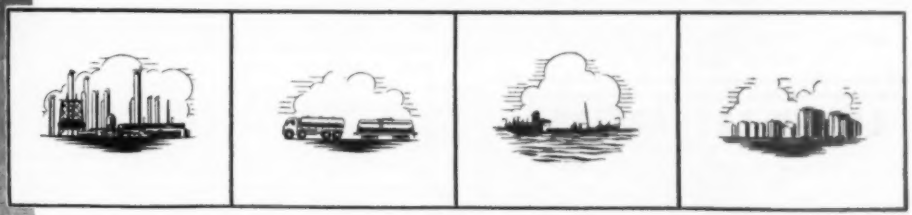

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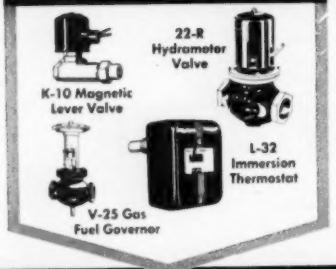

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Background for Nationalization

(Continued from page 27)

should not serve as an advisor and had told the Iranian Minister so, together with his reasons.

If Iran had been seeking an arbitrator, British approval of the choice would be essential—but the case of a technical advisor is another matter. The Iranians could hardly be expected to pick an advisor with British approval as the determining factor—thereby adding fuel to the nationalization flame. The U. S. State Department attitude, officially explained as "non-interference" actually denied the Iranian government freedom of choice. Lacking any technical advisor, the Iranian government can scarcely be blamed for all the mistakes it may make in carrying out its nationalization policy.

Faced with a crisis, and lacking any Middle East foreign policy, the United States so far has simply gone along completely with British policy. As a result anti-American feeling is rising, and we are losing our prestige and good will in Iran. This will certainly have repercussions in the rest of the Middle East.

American oil companies with Middle East investments are nervous as to what may happen to them. With the lessons of Bolivia, Mexico and Venezuela fresh in their minds they have been diligently putting their own Point Four into operation in the field. In their recent concession renegotiations they have been ahead of government thinking—rather than behind it. They are reluctant to criticize the way in which AIOC handled its oil negotiations or to draw comparisons but, in the final analysis, they are all in the same boat.

Everyone is painfully conscious of Russia's impatient desire to appropriate Iran's oil for itself—but it is not generally known that even in the midst of the current violent controversy with the British, Iran has carefully resisted a curious temptation which could so complicate the situation that it might well move Russia into the scene of action immediately.

As will be recalled, Russia occupied northern Persia during the war. When the Iranian government formed its national oil company in 1949 to hold title to the 5/6th of Iran not under concession to AIOC, its first step was to carry out geological exploration. The intent was to gain sufficient information so that as, if and when the national company would entertain agreements for development it would be informed as to the potential value of its holdings.

Geological work in northern Iran uncovered some remarkable Russian secrets. The Russians had actually engaged in a drilling campaign during their occupation. Well sites were carefully covered with dirt and replanted shrubbery, but it is difficult to disguise mudpits and the points upon whica heavy drilling rigs have rested. The holes were capped and some wells had 20-inch surface pipe. This was no exploration core drilling. Wells of 8,000 to 9,000 feet obviously had been drilled. Geological research showed them all to be on favorable structures.

Only an oil man can understand the temptation to even just take pressure readings. But the Iranians, with rare understanding, have carried their investigations no further.

Persia needs no more oil at present. It needs British and American cooperation to help it handle the oil developed under the AIOC concession. If the British Foreign Office and the American State Department continue, by their actions and non-action, to destroy the possibility of any reform government being able to rise from the current anarchy it will be equivalent to handing Iran over to Russia on the traditional silver platter. Russia's foresight in its drilling operations in northern Persia will be justified.

New Extinguisher

A four-lb. dry chemical fire extinguisher with a rubber hose has been introduced by Ansul Chemical Co. Operating range is 12 to 15 feet. It has received a B2, C2 rating from Underwriter's Laboratories. Dry chemical is ejected through a self-closing weather-tight nozzle which produces the fan-shaped pattern. The extinguisher is pressurized by a 1½-oz. carbon dioxide cylinder in the dry chemical chamber. When fully charged, the unit weighs 10½ lbs.

New API Publications

Two new publications have been issued by the Division of Refining of the American Petroleum Institute. They are: "Part IV—Low-Pressure Storage Tanks," ($1.00) of the Manual of Recommended Practices for Refinery Inspections, and API Standard 600: "API Standard on Flanged and Welding-End Steel Wedge-Gate and Plug Valves for Refinery Use," ($2.00). Both publications may be obtained through the Institute, 50 West 50th Street, New York 20, N. Y.

Iceland's First Submarine Pipe Line

Iceland's first submarine pipe line recently came into service at Shell's oil installation at Skerjafjor, and will enable a quicker and more effective discharge for visiting ocean-going tankers, which owing to shallow waters can not tie up at the oil pier. It replaces the 23-year-old floating pipe line. The eight inch pipe was supplied from the United Kingdom and is protected with special wrapping to prevent corrosion. The old floating pipe line had to be run out and brought back every time a tanker required discharging, and was often in danger in bad weather, particularly in winter when there was ice on the fjord.

Expands Oklahoma City Plant

Black, Sivalls & Bryson, Inc., is expanding the productive capacity of its Oklahoma City plant by 50 percent and is moving headquarters of its oil and gas division to that city. Ralph W. Nichols has rejoined the company as sales manager of the oil and gas division. He previously was manager of the company's Fort Worth offices but had left the organization to become sales manager of Richmond Engineering Co. Floyd C. Myers is moving from Kansas City to Oklahoma City as manager of branch operations.

Ralph W. Nichols Floyd C. Myers

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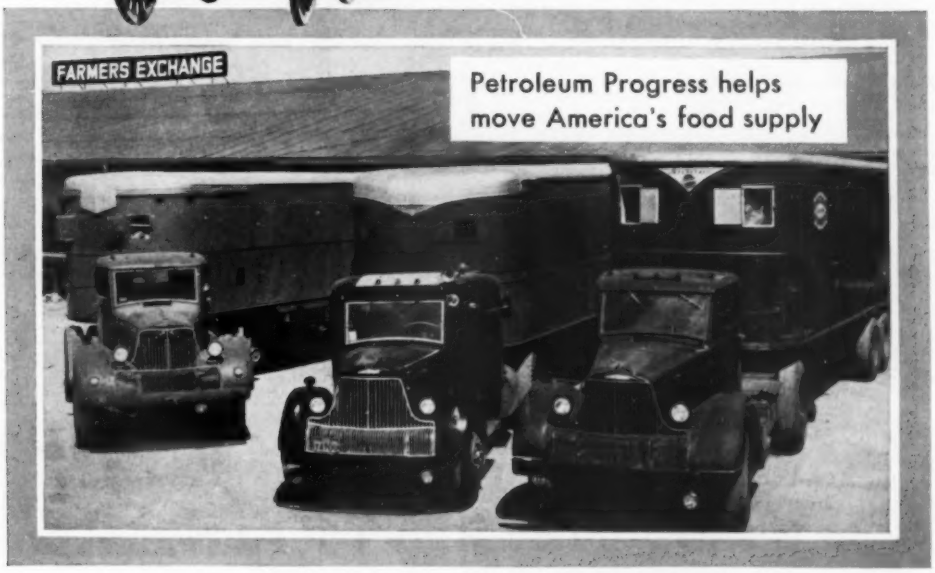

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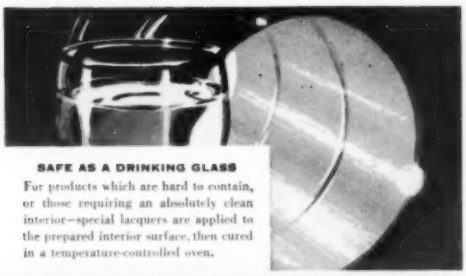

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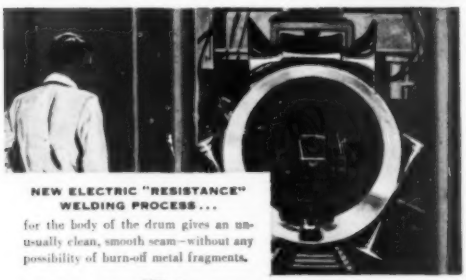

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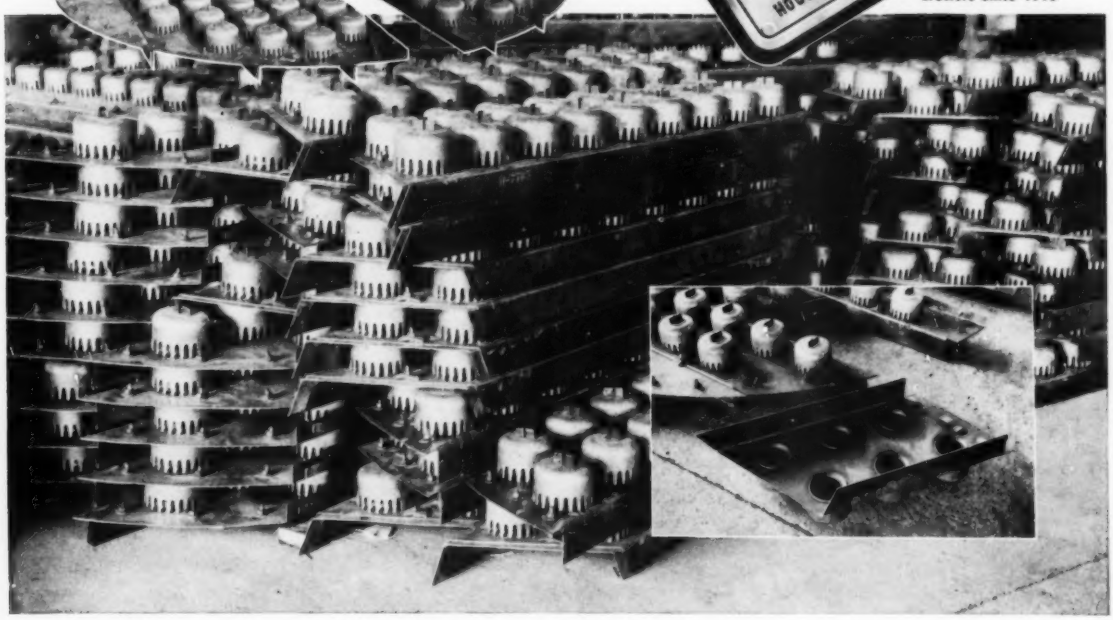
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